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NAVAL CENTER
FOR
SPACE TECHNOLOGY

Full-Sky Astrometric Mapping Explorer (FAME)
Space To Ground Interface Control Document (ICD)

NCST-ICD-FM003 DRAFT V1.0

26 January 2002

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RECORD OF CHANGES

REVISION LETTER	DATE	TITLE OR BRIEF DESCRIPTION	ENTERED BY
—	2 February 2001	1 st Draft for forward link and return link software interfaces for internal review	E. Karlin
—	10 April 2001	2 nd Draft for forward link and return link software interfaces. Incorporate internal review comments.	E. Karlin
—	15 June 2001	3 rd Draft. Changed forward link headers to be word aligned. Allocated APIDs for forward link and return link.	E. Karlin
—	11 July 2001	4 th Draft. Changed return link by adding VCDU error control field for all virtual channels. Removed Command Link Control Word from housekeeping VCDU because uplink status packets will support command authentication. Made slight modifications to format of Version-1 CCSDS packets transmitted in VCDUs and renamed to telemetry packets.	E. Karlin
—	16 July 2001	5 th Draft. Increased start sequence of CLTU to 24 bits. Moved path select information after start sequence instead of encoding in Virtual Channel ID. Increased frame sequence number of TC transfer frame to 16-bits.	E. Karlin
—	13 August 2001	6 th Draft. Initial definition of detailed command packets.	E. Karlin
—	20 August 2001	7 th Draft. Initial definition of detailed telemetry packets.	E. Karlin
—	30 August 2001	8 th Draft. Initial definition of detailed spacecraft event packets.	E. Karlin
—	23 October 2001	9 th Draft. Addition of RF details.	P. Klein
—	26 January 2002	10 th Draft. Initial definition of detailed spacecraft parameter blocks. Increase size of return link VCDU. Another pass through detailed command and telemetry packets.	E. Karlin

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1.0 SCOPE

1.1 Identification

This Interface Control Document (ICD) describes the formats and protocols associated with spacecraft to ground station interfaces for the Full-Sky Astrometric Mapping Explorer (FAME) Observatory program, a NASA Medium Class Explorer (MIDEX) mission scheduled for launch in July 2004.

1.2 System Overview

FAME will provide the positions, proper motions, parallaxes, and photometry of nearly all stars as faint as 15th visual magnitude with accuracies of 50 microarcseconds (mas) at 9th visual magnitude and 500 mas at 15th visual magnitude. Stars will be observed with the Sloan Digital Sky Survey g' , r' , i' , and z' filters for photometric magnitudes. This is accomplished by a scanning survey instrument evolved from *Hipparcos* with a mission life of 2.5 years and an extended mission to 5 years. For more information about the FAME science objectives, refer to NCST-D-FM001, FAME Science Requirements Document.

1.3 Document Overview

This document details the interface between the FAME Space Segment and the FAME Ground Segment. It is organized as follows:

Section 1, *Scope*: The purpose and contents of this document, and an overview of the FAME program.

Section 2, *Referenced Documents*: A list of documents referenced in or required for use with this document.

Section 3, *Interfaces*: The radio frequency and software interfaces between the FAME observatory and the FAME Mission Operations Center (MOC).

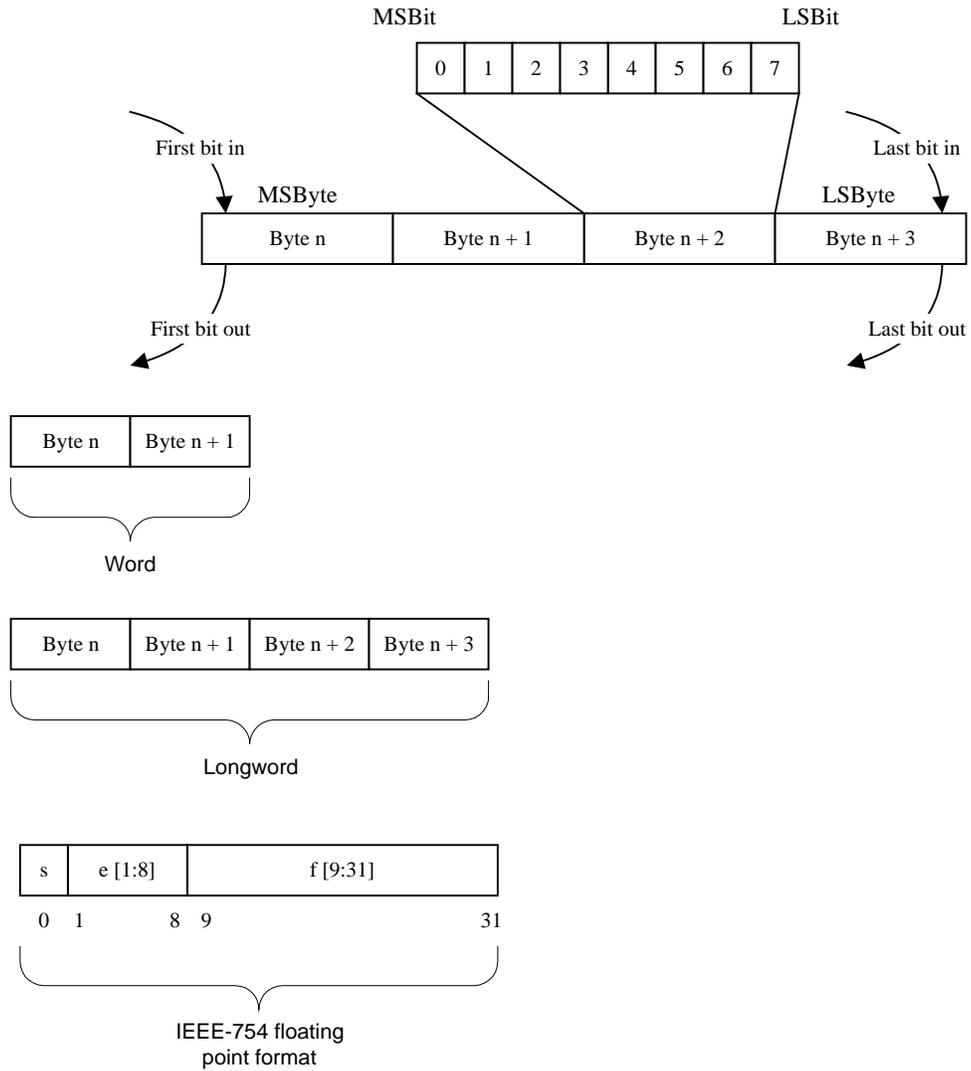
1.4 Data Representation Conventions

Unless otherwise specified, the following data representation conventions are applicable for the entire document:

- Bits are numbered from 0 to n, where 0 represents the most significant bit of the field and n represents the least significant bit in a field.
- The data representations in this document treat bytes as the smallest addressable unit size.
- When multiple bytes are combined to form larger data units the most significant byte of the field is the byte with the lowest address.
- When data are transferred across a serial interface, the bits flow from the most significant bit to the least significant bit.
- The term “word” refers to 16 bits.
- The term “longword” refers to 32 bits.
- Floating-point values are represented in either a 32-bit IEEE-754 format or a 64-bit IEEE-754 format.

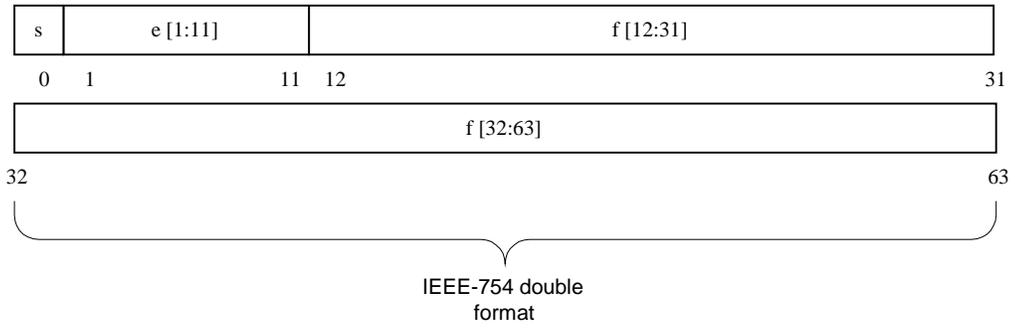
Refer to Figure 1-1 and Figure 1-2 for graphical depictions of the data representation conventions.

Figure 1-1 Data Representation Conventions



IEEE Standard 754 floating-point format consists of three fields stored contiguously in one 32-bit word: a 23-bit fraction, f; an 8-bit biased exponent, e; and a 1-bit sign, s. Bits 9:31 contain the 23-bit fraction with bit 31 being the least significant bit and bit 9 being the most significant; bits 1:8 contain the 8-bit biased exponent with bit 8 being the least significant bit and bit 1 being the most significant; bit 0 contains the sign bit.

Figure 1-2 Data Representation Conventions, Continued



IEEE Standard 754 double format consists of three fields stored in two successively addressed 32-bit words: a 52-bit fraction, f ; an 11-bit biased exponent, e ; and a 1-bit sign, s . Bit 63 is the least significant bit of the entire fraction and bit 32 is the most significant of the 32 least significant fraction bits. Bits 12:31, in the other 32-bit word, contain the most significant bits of the fraction, $f[12:31]$, with bit 31 being the least significant of these 20 most significant fraction bits, and bit 12 being the most significant bit of the entire fraction; bits 1:11, $e[1:11]$, contain the 11-bit biased exponent, e , with bit 11 being the least significant bit of the biased exponent and bit 1 being the most significant; bit 0 contains the sign bit, s .

2.0 APPLICABLE DOCUMENTS

This section lists documents that either are referenced in this Interface Control Document or provide additional information applicable to the understanding of this document.

2.1 NRL Documents

The NRL documents listed in Table 2-1 are FAME project specific.

Table 2-1. NRL Documents

Document Number	Document Title
NCST-D-FM001	Science Requirements Document for the Full-sky Astrometric Mapping Explorer (FAME)
NCST-D-FM002	Mission Requirements Document for the Full-sky Astrometric Mapping Explorer (FAME)

2.2 Military and International Standards

The FAME system uses the military standards (MIL-STD) and international standards listed in Table 2-2.

Table 2-2. Military/International Standards

Document Number	Document Title
CCSDS 101.0-B-4	Consultative Committee for Space Data Systems (CCSDS) Recommendation for Telemetry Channel Coding, May 1999
CCSDS 102.0-B-4	Consultative Committee for Space Data Systems (CCSDS) Recommendation for Packet Telemetry, November 1995
CCSDS 200.0-G-6	Consultative Committee for Space Data Systems (CCSDS) Report for Telecommand: Summary of Concept and Rationale, January 1987
CCSDS 201.0-B-3	Consultative Committee for Space Data Systems (CCSDS) Recommendation for Telecommand: Part 1, Channel Service, June 2000
CCSDS 202.0-B-2	Consultative Committee for Space Data Systems (CCSDS) Recommendation for Telecommand: Part 2, Data Routing Service, November 1992
CCSDS 202.1-B-1	Consultative Committee for Space Data Systems (CCSDS) Recommendation for Telecommand: Part 2.1, Command Operation Procedures, October 1991
CCSDS 203.0-B-1	Consultative Committee for Space Data Systems (CCSDS) Recommendation for Telecommand: Part 3, Data Management Service Architectural Specification, January 1987
CCSDS 701.0-B-2	Consultative Committee for Space Data Systems (CCSDS) Recommendation for Advanced Orbiting Systems, Networks and Data Links: Architectural Specification, November 1992

2.3 NASA Documents

The NASA Documents are listed in Table 2-3.

Table 2-3. NASA Documents

Document Number	Document Title
	Deep Space Network (DSN)

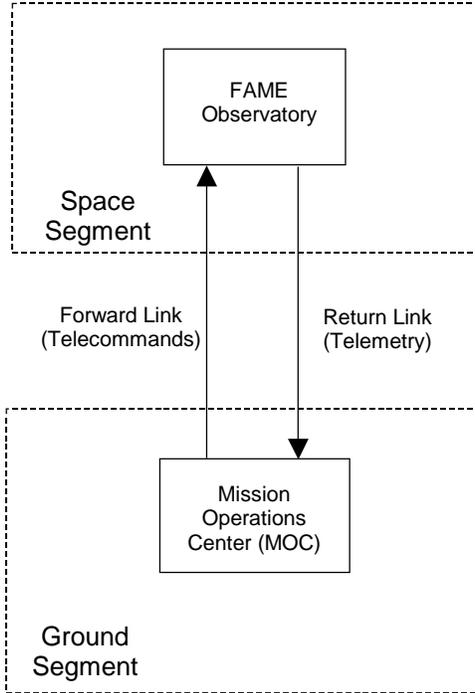
3.0 INTERFACES

This section defines the radio frequency (RF) and software interfaces between the FAME Observatory in the FAME Space Segment and the Mission Operations Center (MOC) in the FAME Ground Segment.

3.1 Interface Identification

The FAME Space Segment to Ground Segment interfaces are depicted in Figure 3-1, *Space/Ground Interfaces*.

Figure 3-1 Space/Ground Interfaces



The Forward Link interface supports commanding of the FAME Observatory in the Space Segment from the Mission Operations Center (MOC) in the Ground Segment. This telecommand interface is based on the conventional CCSDS Telecommand (TC) Recommendations.

The Return Link interface supports ground collection of FAME Observatory telemetry, including both science data and housekeeping data, by the MOC. This telemetry interface is based on the Consultative Committee for Space Data Systems (CCSDS) Telemetry Channel Coding and Advanced Orbiting Systems (AOS) Recommendations. The CCSDS AOS Recommendations specify the use of virtual channels to multiplex downlink information onto a single physical channel. The virtual channel identification assignments are listed in Table 3-1

Table 3-1 Virtual Channel ID Assignments

Virtual Channel ID	Description
0	Not Used
1	Instrument Science Data
2	Instrument Diagnostic Data
3	Instrument Housekeeping Data (State of Health)
4 to 7	Instrument Spares
8	Bus Boot Data
9	Bus Housekeeping Data (State of Health)
10 to 15	Bus Spares
16 to 62	Reserved
63	Idle Data

CCSDS Application Packets are utilized by both the Forward Link interface and the Return Link interface. Application Process Identification (APID) ranges are assigned across both interfaces and across each virtual channel of the Return Link interface to avoid confusion. These APID range assignments are listed in Table 3-2.

Table 3-2 Application Process ID Range Assignment

Application Process ID	Description
0	Not Used
1 to 31	Bus Commands
32 to 63	Instrument Commands
64 to 959	Bus Telemetry
960 to 1855	Instrument Telemetry
1856 to 2031	Reserved by FAME
2032 to 2046	Reserved by CCSDS
2047	Fill Packet

3.2 Forward Link

The forward link interface supports ground initiated FAME spacecraft commanding. The forward link is based on the conventional CCSDS Telecommand (TC) Recommendations that specify a layered approach to telecommanding protocols and formats. Refer to the CCSDS telecommand related documents listed in Section 2.2 for detailed information about the Telecommand Recommendations.

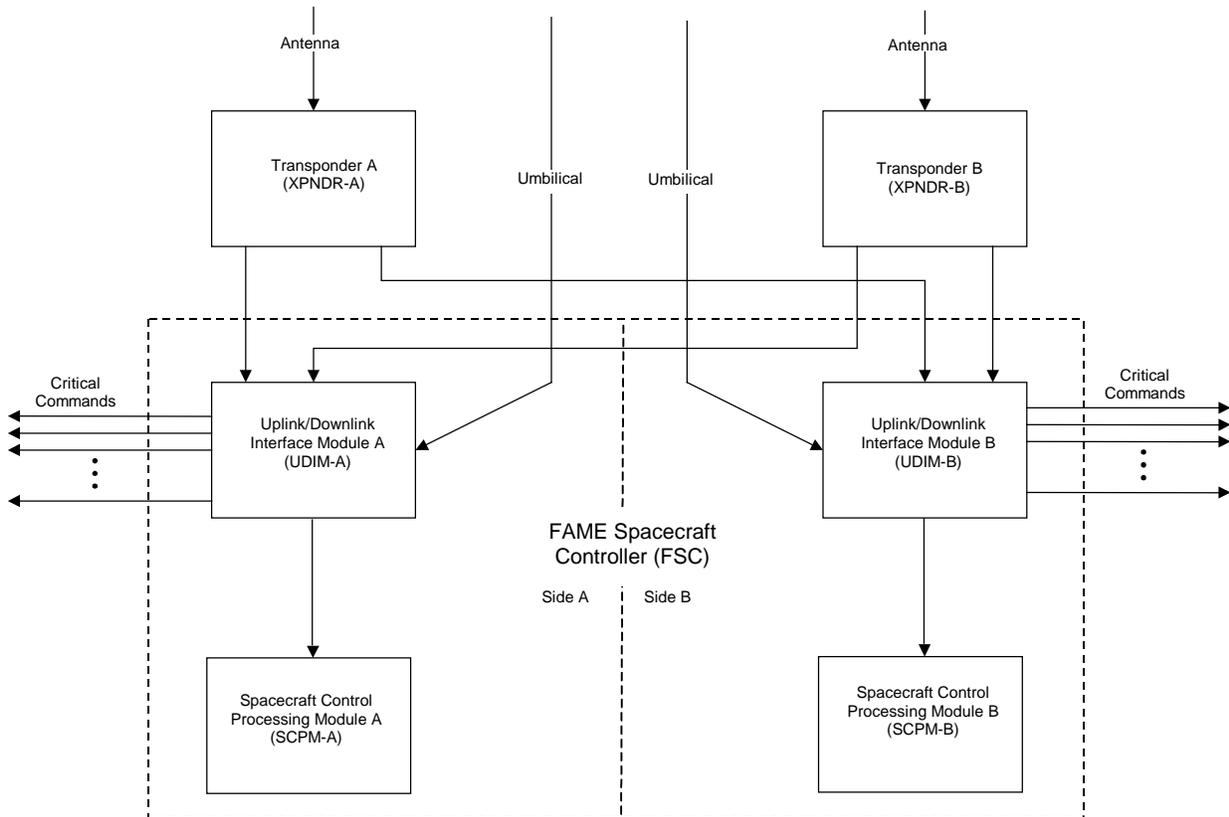
The unencrypted forward link is handled on-board the spacecraft by two redundant transponders and the FAME Spacecraft Controller (FSC) that has two internally redundant sides designated as the A-side and B-side. The forward link data flow is depicted in Figure 3-2.

The receiver in each transponder is always powered on. Both receivers acquire the forward link radio frequency (RF) signal from the antennae and convert this signal to a clock-and-data digital format. The supported data rate is 2000 bps.

Both the A-side and B-side Uplink/Downlink Interface Modules (UDIMs) within the FSC accept the clock-and-data signals from both transponders and the umbilical. Each UDIM searches for a command link transmission unit (CLTU) synchronization pattern, known as the start sequence, from both transponder inputs and the umbilical input. When the start sequence pattern is found, routing information in a path select field is examined by each UDIM. Only one of the UDIMs fully processes the command encoded in the CLTU based on path information in the command structure. The path information can also force the selected UDIM to listen to a particular transponder. If the UDIM is not forced to listen to a single transponder, the signal from which the UDIM finds the start sequence pattern first (could be the umbilical) is the signal that is used to process the CLTU.

All commands are sent from the selected UDIM after decoding to its corresponding Spacecraft Control Processing Module (SCPM) for handling by the flight software (FSW). If the CLTU contains a hardware critical command, the UDIM executes the critical command immediately and sends the critical command data to the SCPM for logging.

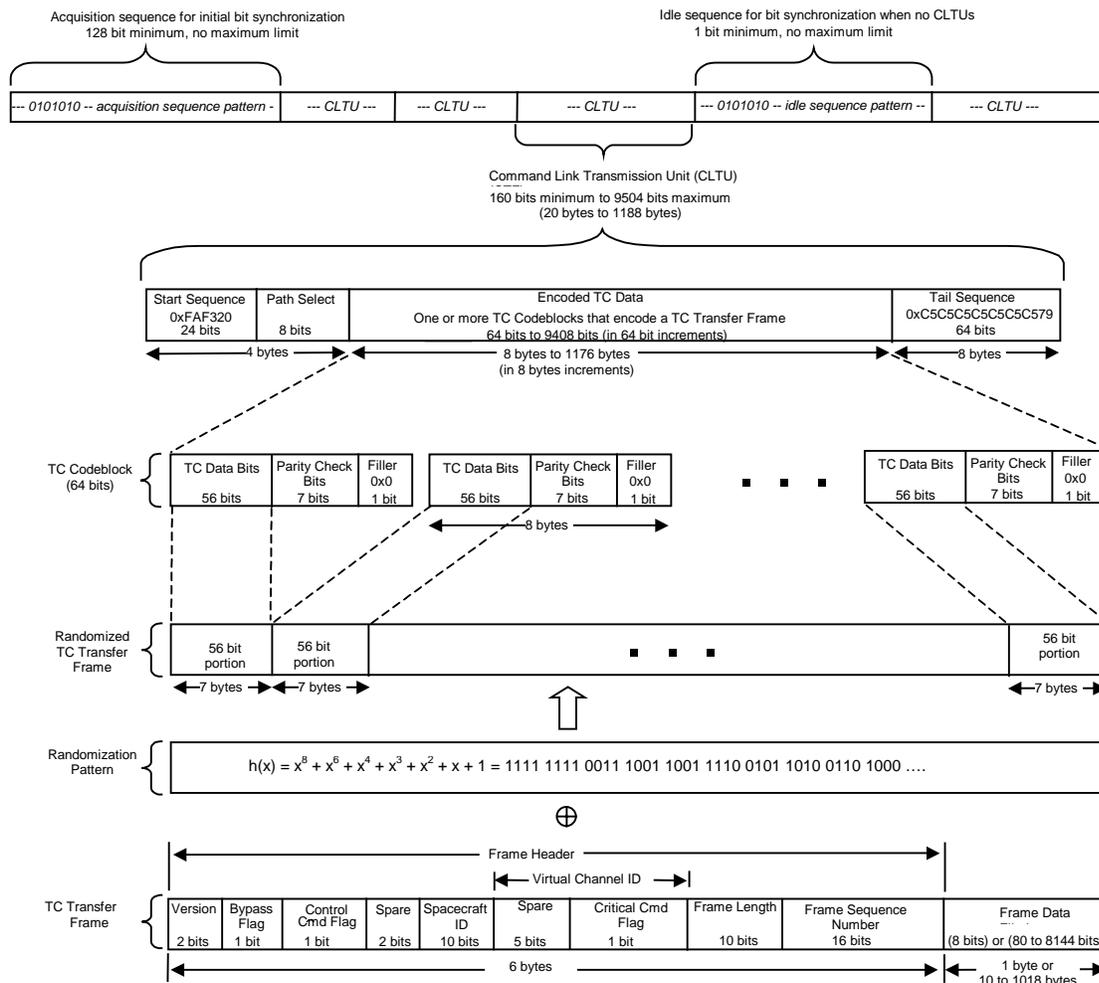
Figure 3-2 Forward Link Data Flow



The CCSDS layering concept for telecommanding as applied to FAME is depicted in Figure 3-3, *Forward Link Digital Protocol* and Figure 3-4, *TC Transfer Frame Digital Protocol*. The lowest layer provides for the transmission of telecommand data using the radio frequency path (i.e. physical channel) connecting the transmitting ground station to the FAME spacecraft. The other layers provide encoding for reliable transmission, data routing, and mission specific content.

An active forward link contains a constantly modulated signal over the physical channel. The top portion of Figure 3-3 depicts the standard data structures sent over the physical channel: acquisition sequence, command link transmission unit (CLTU), and idle sequence. The acquisition sequence is a bit pattern of alternating “ones” and “zeros” that begins with either a “one” or a “zero”. The acquisition sequence provides for initial bit synchronization and its length must be at least 128 bits (preferred minimum in CCSDS). The CLTU data structure contains a single command transmitted to the spacecraft. The idle sequence is a bit pattern of alternating “ones” and “zeros” that begins with either a “one” or a “zero”. The idle sequence provides for bit synchronization when there are no CLTUs being transmitted and its length is an unconstrained number of bits.

Figure 3-3 Forward Link Digital Protocol



3.2.1 Command Link Transmission Unit (CLTU)

The Command Link Transmission Unit (CLTU) is the transport frame for the forward link. The CLTU is depicted in Figure 3-3 and is described in Interface Definition 3-1. Each CLTU contains a 3-byte synchronization pattern known as the start sequence, followed by a 1-byte path select field, followed by a sequence of one or more fixed-size Telecommand (TC) Codeblocks that encode an actual command, followed by a constant 8-byte tail sequence. For FAME, the maximum number of TC Code Blocks in a single CLTU is limited to 147, which supports one TC Transfer Frame with a maximum size of 1024 bytes that are broken up into 56-bit portions (note there will be 5 bytes of fill in the final code block when a TC Transfer Frame of the maximum size is transmitted). Refer to the CCSDS Recommendation for Telecommand Channel Service (CCSDS 201.0-B-3) for further information about the CLTU.

Interface Definition 3-1 Command Link Transmission Unit (CLTU)

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	24	START_SEQUENCE	Constant	0xFAF320	Commanding synchronization pattern.
3	0	8	PATH_SELECT	Byte	0x07 0x19 0x2A 0x36 0x4B 0x52	Provides routing information for the command. 0x07 – UDIM A / Any Xpndr or Umbilical 0x19 – UDIM A / Xpndr A 0x2A – UDIM A / Xpndr B 0x36 – UDIM B / Any Xpndr or Umbilical 0x4B – UDIM B / Xpndr A 0x52 – UDIM B / Xpndr B
4	0	64 to 9408	ENCODED_TC_DATA	Bytes	See TC Codeblock Interface Definition	Sequence of one or more telecommand (TC) codeblocks that encode the actual command data.
12 to 1180	0	64	TAIL_SEQUENCE	Constant	0xC5C5C5C5 C5C5C579	Fixed value that is a non-correctable TC codeblock.

Triple error detection mode is utilized on-board the FAME observatory when processing the Codeblocks to reduce the undetected error rate in CLTUs. This on-board processing strategy is identified in the CCSDS Recommendation for Telecommand Channel Service, Section B4, Channel Service Performance Specification and explained in the CCSDS Report for Telecommand: Summary of Concept and Rationale, Annex D, Telecommand System Performance Notes.

3.2.2 Telecommand (TC) Codeblock

The 8-byte Telecommand (TC) Codeblock depicted in Figure 3-3 and described in Interface Definition 3-2 is used to encode 7-byte portions of telecommand data. The encoding algorithm implements the (63,56) modified Bose-Chaudhuri-Hocquenghem (BCH) code that uses the generator polynomial $g(x) = x^7 + x^6 + x^2 + 1$ to produce the seven parity bits as described in CCSDS Recommendation for Telecommand Channel Service (CCSDS 201.0-B-3), Section 3.3.2, TC Codeblock Encoding Procedure. The parity bits are complemented before insertion into the parity check bits field to help maintain bit synchronization and to help detect bit slippage. If the final TC Codeblock in a CLTU contains less than 7 bytes of telecommand data, fill is appended. Fill is defined as a sequence of alternating 'ones' and 'zeros' starting with a 'zero'.

Interface Definition 3-2 TC Codeblock

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	56	TC_DATA_BITS	Bytes	None.	Seven bytes of telecommand data. The parity bit for each byte is contained below. [If a TC code block contains less than 7 bytes of 'real' data, fill shall be inserted. Fill is a sequence of alternating 'ones' and 'zeros' starting with a 'zero'.]
7	0	7	PARITY_CHECK_BITS	Byte	None.	Complement of seven parity bits for the seven bytes above. The code used is a (63,56) modified Bose-Chaudhuri-Hocquenghem (BCH) code which uses the following generator polynomial to produce the seven parity bits: $g(x) = x^7 + x^6 + x^2 + 1$ (See CCSDS 201.0-B-3 Figure 3-4 for details.)
7	7	1	FILLER	Constant	0	Fixed value.

The telecommand data are pseudo-randomized before encoding using the randomization procedure described in the CCSDS Recommendation for Telecommand Channel Service (CCSDS 201.0-B-3), Section 3.3.1, Randomization Procedure. The randomization is accomplished by exclusive ORing the telecommand data with the pseudo-random sequence generated using the polynomial $h(x) = x^8 + x^6 + x^4 + x^3 + x^2 + x + 1$. This randomization is employed to provide a sufficient bit transition density to maintain bit synchronization of the received telecommand signal.

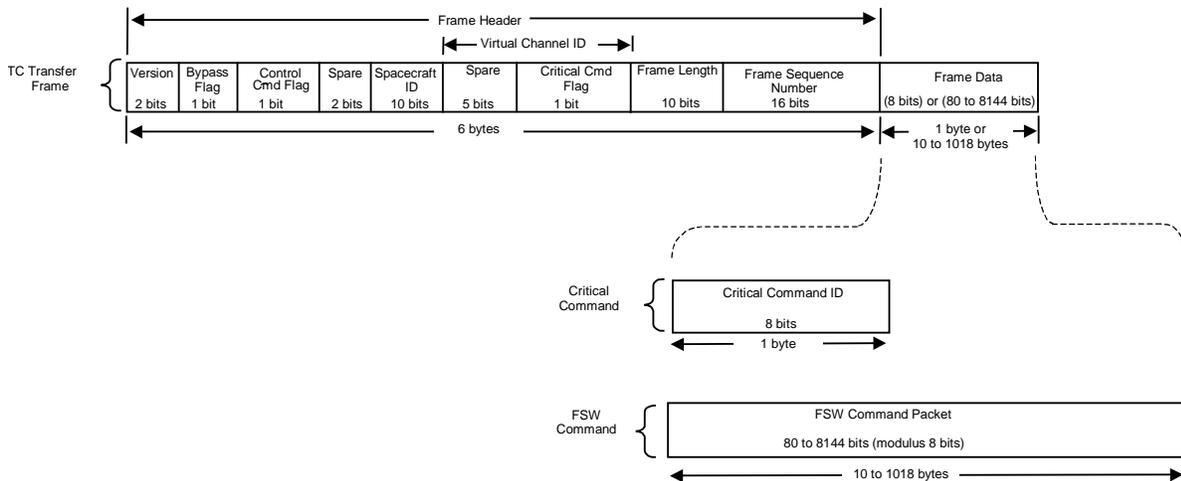
3.2.3 Telecommand (TC) Transfer Frame

The Telecommand (TC) Transfer Frame is used to reliably transfer all commands types to the FAME spacecraft. Refer to the CCSDS Recommendation for Telecommand Data Routing Service (CCSDS 202.0-B-2), Section 4, Transfer Layer: Standard Data Structures and Procedures, for details about the TC Transfer Frame. The TC Transfer Frame and its embedded command types are depicted in Figure 3-4, *TC Transfer Frame Digital Protocol*. Interface Definition 3-3 provides the details for the fields of the TC Transfer Frame.

The TC Transfer Frame contains a flag (CONTROL_CMD_FLAG) to indicate whether the frame data field is conveying a normal spacecraft command or a CCSDS Command Operating Procedure (COP-1) Frame Acceptance and Reporting Mechanism (FARM) control command. This flag is not used for FAME. Instead, a normal spacecraft command is used to control command authentication processing.

The TC Transfer Frame virtual channel identification field for FAME is internally partitioned as allowed by the CCSDS Recommendations to specify different spacecraft data handling chains. As depicted in Figure 3-4 and detailed in Interface Definition 3-3, the virtual channel identification field is subdivided into a spare field and a spacecraft command type indicator field (CRITICAL_CMD_FLAG).

Figure 3-4 TC Transfer Frame Digital Protocol



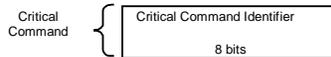
Interface Definition 3-3 TC Transfer Frame

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	2	VERSION_NUMBER	Constant	0	Identifies the CCSDS Version-1 TC Transfer Frame.
0	2	1	BYPASS_FLAG	Bit	0 = Type-A (normal authentication check) 1 = Type-B (bypass authentication check)	Indicates whether authentication is performed on the FRAME_SEQUENCE_NUMBER. Type-A frames are subject to the normal frame authentication checks. For Type-B frames, the normal frame authentication check is bypassed. This field is always set to Type-B when the CRITICAL_CMD_FLAG is set to Critical.
0	3	1	CONTROL_CMD_FLAG	Constant	0	Not used for FAME.
0	4	2	RESERVED_SPARE	Constant	0	Spare bits reserved by CCSDS.
0	6	10	SPACECRAFT_ID	Constant	0x8A	Identifies the FAME Observatory.
2	0	5	SPARE	Bits	0	Spare bits.
2	5	1	CRITICAL_CMD_FLAG	Bit	0 = Non-critical 1 = Critical	Identifies whether the normal spacecraft command in the FRAME_DATA field is a critical command (i.e. hardware command) or a flight software [FSW] command.
2	6	10	FRAME_LENGTH	Word	6 to 1023	Total number of bytes in the telecommand transfer frame minus 1.
4	0	16	FRAME_SEQUENCE_NUMBER	Word	0 to 65535 for Type-A frames 0 for Type-B frames	Sequential count (modulo 65,536) of the total number of telecommand Type-A frames sent.
6	0	8 to 8144 (mod 8)	FRAME_DATA	Bytes	See Interface Definitions for structures specified in description.	Contains one critical or FSW command. If CRITICAL_CMD_FLAG = 1 then CRITICAL_CMD; If CRITICAL_CMD_FLAG = 0 then FSW_CMD;

3.2.3.1 Critical Commands

A critical command is a command that is executed on-board the spacecraft without the need for intervention by the FSC Spacecraft Control Processing Module (SCPM). The FSC Uplink/Downlink Interface Module (UDIM) contains the electronics to select and execute the FAME critical commands. The critical command format is depicted in Figure 3-5 and described in Interface Definition 3-4.

Figure 3-5 Critical Command Format



Interface Definition 3-4 Critical Command

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	8	CRITICAL_CMD_ID	Byte	See Table 3-3, <i>Critical Command List</i> .	Identifies the critical command to be executed.

The critical command identification field contains an 8-bit value that identifies the critical command. Table 3-3, *Critical Command List*, identifies each critical command and lists its attributes. The Boolean value “True” or “False” is listed under the UDM A and UDM B columns to indicate whether that UDM handles the critical command or not, respectively. Most critical commands are accessible from both UDMs. However, some critical commands are available from only one UDM as indicated in the table.

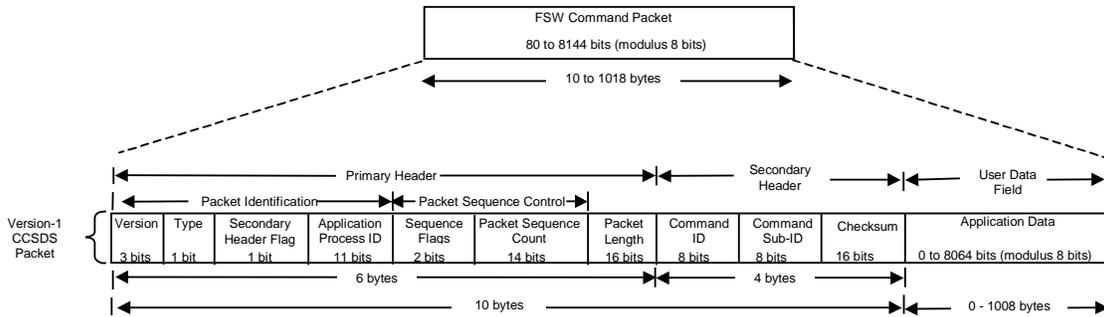
Table 3-3 Critical Command List [TBD]

Critical Command ID	Subsystem	Unit	Description	UDM A	UDM B
4	EPS	LCU	FSC A OFF/B OFF	True	True
6	EPS	LCU	FSC A ON/B OFF	True	True
7	EPS	LCU	FSC A OFF/B ON	True	True
8	CTDH	UDIM_A	UDM B RESET	True	False
8	CTDH	UDIM_B	UDM A RESET	False	True
9	CTDH	SCPM_A	FSC A RESET	True	False
9	CTDH	SCPM_B	FSC B RESET	False	True

3.2.3.2 Flight Software (FSW) Commands

A flight software (FSW) command is a command handled by the software running in the FSC Spacecraft Control Processing Module (SCPM). The FSW command packet format is depicted in Figure 3-6 and described in Interface Definition 3-5.

Figure 3-6 FSW Command Packet Format



Interface Definition 3-5 FSW Command Packet

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	3	VERSION_NUMBER	Constant	0	Identifies the Version-1 CCSDS Packet.
0	3	1	TYPE	Constant	1	Indicates a telecommand packet.
0	4	1	SECONDARY_HDR_FLAG	Constant	1	Indicates the secondary header is used. The secondary header contains the CMD_ID, CMD_SUBID, and CHECKSUM fields.
0	5	11	APID	Word	0 to 31 - Bus 32 to 63 - Instr. See Table 3-4, <i>Application Process ID Assignments</i> .	Application process Identifier. This command routing code identifies the queue that receives the command. Each queue is assigned to a single task. The queue and task assignments can be found in Table 3-4, <i>Application Process ID Assignments</i> .
2	0	2	SEQUENCE_FLAGS	Bits	0 = Middle 1 = First 2 = Last 3 = Standalone	Indicates whether this packet is a complete structure or a component of a higher layer data structure. All packets for FAME are identified as Standalone.
2	2	14	PACKET_SEQUENCE_COUNT	Word	None.	Sequential counter (modulo 16384) for the application process id (APID). Used for loads.

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Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
4	0	16	PACKET_LENGTH	Word	3 to 1011	Length in bytes of the fields to follow minus 1.
6	0	8	CMD_ID	Byte	See Table 3-5, <i>Command List by ID</i> .	Command packet identifier. The command packet identifier is used to identify the format and content of command packets.
7	0	8	CMD_SUBID	Byte	See Table 3-5, <i>Command List by ID</i> .	Command packet sub-identifier. The sub-identifier is an application dependent field whose value does not cause a variance in the packet format, however its value may control whether selected fields are used or ignored.
8	0	16	CHECKSUM	Word	None	Sum-to-zero checksum for the command packet.
10	0	0 to 8064 (mod 8)	APPLICATION_DATA	Words	None.	Contains command specific data.

The FSW command format is defined to conform to the CCSDS Version-1 Application Packet. The application process ID is used by the SCPM to route a command to the flight software task that executes the command. If a command is sent with an invalid application process ID the command is rejected. If a command is routed to a task that cannot handle the command (based on command ID), the command is rejected. Table 3-4, *Application Process ID Assignments*, contains a summary of the routing codes. Each command packet definition identifies which task(s) processes the command. During boot, the application process ID (i.e. route code) is ignored.

Table 3-4 Application Process Id Assignments

Application Process Id	Queue	Task
0xA	BKGRND_DIAGS_CMD_Q	BKGRND_DIAGS_TASK
0xB	BOOT_CMD_Q	BOOT_TASK
0xC	FWL_CMD_Q	CMD_UPLINK_TASK
0xD	CMD_PROC_CMD_Q	CMD_PROC_TASK
0xE	DISPOSITION_Q	CMD_UPLINK_TASK
0xF	INTER_CMD_Q	LOCAL_BUS_MGR
0x10	INTRA_CMD_Q	CMD_UPLINK_TASK
0x11	ISR_EVENT_Q	TASK_MGR
0x12	MEM_CMD_Q	MEM_MGR
0x13	SCL_DISPOSITION_Q	CMD_PROC_TASK
0x14	SCL_EVENT_Q	CMD_PROC_TASK
0x15	SCL_RTCD_Q	CMD_PROC_TASK
0x16	SCL_SCE_RTCD_Q	CMD_PROC_TASK
0x17	SCS_COMMAND_Q	CMD_UPLINK_TASK
0x18	TASK_CMD_Q	TASK_MGR
0x19	TIME_CMD_Q	TIME_MGR
0x1A	TLM_PROC_CMD_Q	TLM_PROC_TASK
0x1B	TLM_PROC_DECOM_Q	TLM_PROC_TASK
0x1C	TLM_DOWNLINK_CMD_Q	TLM_DOWNLINK_TASK
0x1D	ADAC_CMD_Q	ADAC_TASK
0x1E	LOCAL_BUS_Q	LOCAL_BUS_MGR
0x1F	HW_MGR_CMD_Q	HW_MGR

Table 3-5, *Command List by ID*, and Table 3-6 *Command Characteristics Table*, present a summary of all commands listed by identifier.

Table 3-5 Command List by ID

Command ID	Category	Name	Description	Sub ID Constraints	APID
0x3E	RM	MEM_BLE	Memory Block Load Enable	1 - EEPROM 2 - RAM	0x12
0x3F	RM	OBJ_BLE	Object Block Load Enable	0 - SUB_RES	0x12
0x40	BOOT	EXT_DIAG_CTL	Extended Diagnostic Control	1 - EDC_SUB_DEFAULT 2 - EDC_SUB_SPECIFIED	0xB
0x41	RM	BACK_DIAG_CTL	Background Diagnostic Control	1 - BDC_SUB_DIS 2 - BDC_SUB_ENA	0xA
0x42	RM	INT_CTL	Interrupt Control	1 - DISABLE 2 - ENABLE	0x1F
0x43	RM	MEM_DUMP	Memory Dump	1 - EEPROM 2 - RAM 3 - EEPROM_COMPRESS 4 - RAM_COMPRESS	0x12
0x44	RM	OBJ_CTL	Object Control	1 - CLEAR 2 - READY 3 - SELECT	0x12
0x46	RM	OBJ_DUMP	Object Dump	0 - SUB_RES	0x12
0x47	RM	TIME_CTL	Time Control	1 - SUB_SET 2 - SUB_ADJUST	0x19
0x48	RM	SYS_RESET	System Reset	1 - SUB_WARM_START 2 - SUB_WD 3 - SUB_COLD_START	0xC
0x49	RM	TASK_MGR	Task Manager	1 - REMOVE 2 - ADD 3 - SUSPEND 4 - RESUME	0x18
0x4A	RM	TASK_REQ	Task Request	1 - RESET 2 - SHUTDOWN	Any. See Table 3-4 Application Process ID Assignments
0x4B	CAT	EVENT_CTL	Control Event Processing	1 - CLEAR 2 - DIS_DL 3 - ENA_DL	0x12
0x4C	CAT	SCL_TOKENS	SCL Tokens	0 - SUB_RES	0xD
0x4D	CAT	LOG_CTL	Log Control	1 - STOP 2 - START_SOF 3 - START_OOF 4 - CLEAR 5 - DUMP 6 - DUMP_COMPRESSED	0x12
0x4E	CAT	NOOP	No Operation	0 - SUB_RES	Any. See Table 3-4 Application Process ID Assignments
0x4F	CAT	SCS_CTL	Stored Command Sequence Control	1 - START 2 - STOP 3 - PAUSE 4 - RESUME 5 - SCHEDULE_ABS 6 - SCHEDULE_REL 7 - CANCEL 8 - ENABLE 9 - DISABLE 10 - REMOVE_SCS 11 - REMOVE_DB	0xD

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Command ID	Category	Name	Description	Sub ID Constraints	APID
				12 - CLEAN	
0x50	CAT	SET_AUTH	Set Authenticate Count	0 - SUB_RES	0xC
0x51	CAT	SWDIAG_REQ	Software Diagnostics Request	1 - COUNT 2 - CONTINUOUS 3 - STOP	0x1C
0x52	BOOT	GO	Start Operational Software	1 - NORMAL 2 - BYPASS 3 - DIAG 4 - DIAG_HALT 5 - JUMP	0xB
0x53	RM	SCS_DUMP_RESOURCE	SCS Object Dump	0 - SCRIPT 1 - RULE 2 - DBRTE 3 - DBREC 4 - DBITEM 5 - FWD_LIST 6 - BWD_LIST 7 - MCCC_LIST 8 - DB_VTBL 9 - DB_COEF 10 - RULELIST 11 - TABLE_SCRIPT_RULE 12 - TABLE_DB	0x12
0x54	RM	WATCHDOG_CTL	Watchdog Manager Control	1 - WDOG_CTL_SUB_REMOVE 2 - WDOG_CTL_SUB_ADD	0x19
0x55	RM	OBJ_BLOCK_LOAD	Object Block Load	0 - SUB_RES	0x12
0x56	RM	MEM_BLOCK_LOAD	Memory Block Load	0 - SUB_RES	0x12
0x58	RM	CANCEL_MEM_DUMP	Cancel Memort Dump	0 - SUB_RES	0x12
0x59	CAT	RL_FORMAT_CTL	Return Link Format Control	0 - SUB_RES	0x1C
0x63	CAT	RL_BR_CTL	Return Link Bit Rate Control	0 - SUB_RES	0x1C
0x64	HW	INSTR_CTL	Instrument Control	0 - SUB_RES	0xA
0x65	HW	INSTR_CFG	Instrument Configuration	0 - SUB_RES	0xA
0x66	GNC	ATT_ADJ	Attitude Adjustment	1 - PRIMARY 2 - SECONDARY 3 - ALL 4 - BYPASS	0x1D
0x67	GNC	ATT_RESET	Attitude Reset	1 - PRIMARY 2 - SECONDARY 3 - ALL 4 - BYPASS	0x1D
0x68	GNC	IMU_SELECT	IMU Select	0 - SUB_RES	0x1D
0x6B	GNC	IMU_DRIFT	Set IMU Drift Rates	1 - PRIMARY 2 - SECONDARY 3 - BYPASS 4 - ALL	0x1D
0x6E	HW	RIU	RIU Command	1 - RIU_1 2 - RIU_2	0x1E

Notes:

Command ID: The command identifier.

Category: The command category.

RM – Resource Management

H/W - Hardware

CAT – Command and Telemetry

BOOT – Boot

GNC – Guidance, Navigation and Control

Name: The command packet name.

Description: Brief command description.

Sub ID Constraints: Range limitations for the command sub identifier.

APID: The application identifier that serves as the task routing code for the command.

Table 3-6 Command Characteristics Table

Cmd ID	Name	SCS	Boot	Operational	Max. Execution Time (seconds)	Min. Delay Between Commands (seconds)	Length
0x3E	MEM_BLE	False	True	True	1	0.15	14
0x3F	OBJ_BLE	False	False	True	1	0.15	10
0x40	EXT_DIAG_CTL	False	True	False	1	0.015	10
0x41	BACK_DIAG_CTL	True	False	True	5	0.015	4
0x42	INT_CTL	False	False	True	1	0.015	2
0x43	MEM_DUMP	True	True	True	1	0.015	10
0x44	OBJ_CTL	False	False	True	1	0.015	2
0x46	OBJ_DUMP	True	False	True	1	0.015	4
0x47	TIME_CTL	False	False	True	1	0.015	8
0x48	SYS_RESET	False	True	True	1	0.015	0
0x49	TASK_MGR	False	False	True	1	0.015	2
0x4A	TASK_REQ	False	False	True	5	0.015	0
0x4B	EVENT_CTL	True	True	True	1	0.015	4
0x4C	SCL_TOKENS	False	False	True	1	0.015	96
0x4D	LOG_CTL	True	False	True	1	0.015	20
0x4E	NOOP	True	True	True	5	0.015	0
0x4F	SCS_CTL	False	False	True	1	0.015	22
0x50	SET_AUTH	False	True	True	1	0.015	2
0x51	SWDIAG_REQ	True	False	True	1	0.015	4
0x52	GO	False	True	False	1	0.015	4
0x53	SCS_DUMP_RESOURCE	True	False	True	1	0.015	4
0x54	WATCHDOG_CTL	False	False	True	1	0.015	2
0x55	OBJ_BLOCK_LOAD	False	False	True	1	0.2	1008
0x56	MEM_BLOCK_LOAD	False	True	True	1	0.2	1008
0x58	CANCEL_MEM_DUMP	True	True	True	1	15	0
0x59	RL_FORMAT_CTL	True	False	True	1	0.15	2
0x63	RL_BR_CTL	True	True	True	1	0.15	2
0x64	INSTR_CTL	True	False	True	1	0.15	0
0x65	INSTR_CFG	True	False	True	1	0.15	4
0x66	ATT_ADJ	False	False	True	1	0.015	16
0x67	ATT_RESET	False	False	True	1	0.015	28
0x68	IMU_SELECT	False	False	True	1	0.015	4
0x6B	IMU_DRIFT	False	False	True	1	0.015	12
0x6E	RIU	True	False	True	1	0.088	6

Notes:

Cmd ID: The command identifier.

Name: The command packet name.

SCS: The command can be issued from a stored command sequence.

Boot: The command can be issued during the boot monitor stage.

Operational: The command can be issued during the operational mode of the flight software.

Maximum Execution Time: The maximum amount of time the flight software will wait for the command to complete. If this time is exceeded, a failure command response is issued. This value is specified in seconds.

Minimum Delay between Commands: The minimum amount of time the system must wait before another command (of any type) can be sent. This value is specified in seconds.

Length: The number of bytes in the application data field.

Table 3-7 Parameter Block Characteristics Table

Name	ID	Slots	Length	Description
OBJ_SCS	10	2	16388	Stored Command Sequence Parameter Block
OBJ_TIMEKEEPING	11	2	52	Timekeeping Parameter Block
OBJ_AC_PARAM	22	5	240	Attitude Control Parameter Block

Notes:

Name: The parameter block name.

ID: The parameter block identifier.

Slots: The number of slots allowed.

Length: The number of bytes in the application data field.

Description: Brief parameter block description.

3.2.3.3 Detailed Flight Software (FSW) Command Packet Definitions

This subsection defines each command packet in detail. Each command packet definition contains a description, the command characteristics, the values of unique header fields, and the format of the command parameters stored in the application data field of the command packet. Protocol requirements and constraints are provided where applicable.

The following characteristics will be identified for each command:

- **Name:** The command template name.
- **Command ID:** The command identifier
- **Task:** The flight software component that will process the command.
- **Constraints:** Identifies constraints on command usage.
- **SCS:** The command can be issued from a stored command sequence.
- **Boot:** The command can be issued during the boot monitor stage.
- **Operational:** The command can be issued during the operational mode of the flight software.
- **Maximum Execution Time:** The maximum amount of time the flight software will wait for the command to complete. If this time is exceeded, a failure command response is issued. This value is specified in seconds.
- **Minimum Delay between Commands:** The minimum amount of time the system must wait before another command (of any type) can be sent. This value is specified in seconds.
- **Packet Length:** The value stored in the length field of the command packet header. This is the number of bytes in the secondary header and the application data field minus 1.

3.2.3.3.1 BOOT

3.2.3.3.1.1 Extended Diagnostic Control (EXT_DIAG_CTL)

The extended diagnostic control command is used to control the execution of ISC diagnostics while the ISC is in the boot monitor mode. This command requests immediate execution of an extended diagnostic test. To stop diagnostics, set both diagnostic mask fields to zero or use the GO command with the DIAG_HALT subid.

Name: *EXT_DIAG_CTL*

Command ID: *0x40*

Task: *BOOT_TASK*

Constraints: *Only available in the boot monitor mode.*

SCS: *False*

Boot: *True*

Operational: *False*

Maximum Execution Time (seconds): *1*

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Minimum Delay Between Commands (seconds): 0.015

Packet Length: 13

Interface Definition 3-6 EXT_DIAG_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description																																																										
0	5	11	APID	None	UInt8	0xB	Command routing code for BOOT_CMD_Q																																																										
4	0	16	PACKET_LENGTH	None	UInt8	13	Command packet length.																																																										
6	0	8	CMD_ID	None	UInt8	0x40	Command packet identifier.																																																										
7	0	8	CMD_SUBID	None	UInt8	1 - EDC_SUB_DEFAULT 2 - EDC_SUB_SPECIFIED	Command packet sub-identifier. 1) Execute default diagnostic set. 2) Execute diagnostics specified in EDC_MASK_1 and EDC_MASK_2.																																																										
10	0	32	EDC_MASK_1	1	UInt32	None	<table border="0"> <tr> <td>## Diagnostic</td> <td>Mask</td> </tr> <tr> <td>0 XDIAG_MAIN_MEM_U</td> <td>0x1</td> </tr> <tr> <td>1 XDIAG_MAIN_MEM_C</td> <td>0x2</td> </tr> <tr> <td>2 XDIAG_ICACHE_MEM</td> <td>0x4</td> </tr> <tr> <td>3 XDIAG_DCACHE_MEM</td> <td>0x8</td> </tr> <tr> <td>4 XDIAG_STCA_MEM</td> <td>0x10</td> </tr> <tr> <td>5 XDIAG_STCB_MEM</td> <td>0x20</td> </tr> <tr> <td>6 XDIAG_1553A_MEM</td> <td>0x40</td> </tr> <tr> <td>7 XDIAG_1553B_MEM</td> <td>0x80</td> </tr> <tr> <td>8 XDIAG_1553C_MEM</td> <td>0x100</td> </tr> <tr> <td>9 XDIAG_CDUA_MEM</td> <td>0x200</td> </tr> <tr> <td>10 XDIAG_CDUB_MEM</td> <td>0x400</td> </tr> <tr> <td>11 XDIAG_XPOND_MEM</td> <td>0x800</td> </tr> <tr> <td>12 XDIAG_IMUA_MEM</td> <td>0x1000</td> </tr> <tr> <td>13 XDIAG_IMUB_MEM</td> <td>0x2000</td> </tr> <tr> <td>14 XDIAG_IMUC_MEM</td> <td>0x4000</td> </tr> <tr> <td>15 <reserved></td> <td>0x8000</td> </tr> <tr> <td>16 XDIAG_BOOTPROM_CHKSUM</td> <td>0x10000</td> </tr> <tr> <td>17 XDIAG_UEEPROM_CHKSUM</td> <td>0x20000</td> </tr> <tr> <td>18 XDIAG_TIMER0</td> <td>0x40000</td> </tr> <tr> <td>19 XDIAG_TIMER1</td> <td>0x80000</td> </tr> <tr> <td>20 XDIAG_TIMER2</td> <td>0x100000</td> </tr> <tr> <td>21 XDIAG_TIMER3</td> <td>0x200000</td> </tr> <tr> <td>22 XDIAG_FPU</td> <td>0x400000</td> </tr> <tr> <td>23 XDIAG_DMA1</td> <td>0x800000</td> </tr> <tr> <td>24 XDIAG_DMA2</td> <td>0x1000000</td> </tr> <tr> <td>25 XDIAG_MBUS_EDAC</td> <td>0x2000000</td> </tr> <tr> <td>26 XDIAG_IBUS_EDAC</td> <td>0x4000000</td> </tr> <tr> <td>27 XDIAG_DBUS_EDAC</td> <td>0x8000000</td> </tr> </table>	## Diagnostic	Mask	0 XDIAG_MAIN_MEM_U	0x1	1 XDIAG_MAIN_MEM_C	0x2	2 XDIAG_ICACHE_MEM	0x4	3 XDIAG_DCACHE_MEM	0x8	4 XDIAG_STCA_MEM	0x10	5 XDIAG_STCB_MEM	0x20	6 XDIAG_1553A_MEM	0x40	7 XDIAG_1553B_MEM	0x80	8 XDIAG_1553C_MEM	0x100	9 XDIAG_CDUA_MEM	0x200	10 XDIAG_CDUB_MEM	0x400	11 XDIAG_XPOND_MEM	0x800	12 XDIAG_IMUA_MEM	0x1000	13 XDIAG_IMUB_MEM	0x2000	14 XDIAG_IMUC_MEM	0x4000	15 <reserved>	0x8000	16 XDIAG_BOOTPROM_CHKSUM	0x10000	17 XDIAG_UEEPROM_CHKSUM	0x20000	18 XDIAG_TIMER0	0x40000	19 XDIAG_TIMER1	0x80000	20 XDIAG_TIMER2	0x100000	21 XDIAG_TIMER3	0x200000	22 XDIAG_FPU	0x400000	23 XDIAG_DMA1	0x800000	24 XDIAG_DMA2	0x1000000	25 XDIAG_MBUS_EDAC	0x2000000	26 XDIAG_IBUS_EDAC	0x4000000	27 XDIAG_DBUS_EDAC	0x8000000
## Diagnostic	Mask																																																																
0 XDIAG_MAIN_MEM_U	0x1																																																																
1 XDIAG_MAIN_MEM_C	0x2																																																																
2 XDIAG_ICACHE_MEM	0x4																																																																
3 XDIAG_DCACHE_MEM	0x8																																																																
4 XDIAG_STCA_MEM	0x10																																																																
5 XDIAG_STCB_MEM	0x20																																																																
6 XDIAG_1553A_MEM	0x40																																																																
7 XDIAG_1553B_MEM	0x80																																																																
8 XDIAG_1553C_MEM	0x100																																																																
9 XDIAG_CDUA_MEM	0x200																																																																
10 XDIAG_CDUB_MEM	0x400																																																																
11 XDIAG_XPOND_MEM	0x800																																																																
12 XDIAG_IMUA_MEM	0x1000																																																																
13 XDIAG_IMUB_MEM	0x2000																																																																
14 XDIAG_IMUC_MEM	0x4000																																																																
15 <reserved>	0x8000																																																																
16 XDIAG_BOOTPROM_CHKSUM	0x10000																																																																
17 XDIAG_UEEPROM_CHKSUM	0x20000																																																																
18 XDIAG_TIMER0	0x40000																																																																
19 XDIAG_TIMER1	0x80000																																																																
20 XDIAG_TIMER2	0x100000																																																																
21 XDIAG_TIMER3	0x200000																																																																
22 XDIAG_FPU	0x400000																																																																
23 XDIAG_DMA1	0x800000																																																																
24 XDIAG_DMA2	0x1000000																																																																
25 XDIAG_MBUS_EDAC	0x2000000																																																																
26 XDIAG_IBUS_EDAC	0x4000000																																																																
27 XDIAG_DBUS_EDAC	0x8000000																																																																
14	0	32	EDC_MASK_2	2	UInt32	None	## Diagnostic Mask																																																										

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
							32 XDIAG_SCIMA_TEST 0x1 33 XDIAG_SCIMB_TEST 0x2 34 XDIAG_XPOND_INTR 0x4 35 XDIAG_TICKA_INTR 0x8 36 XDIAG_TICKB_INTR 0x10 37 XDIAG_EPOCHB_INTR 0x20 38 XDIAG_EPOCHB_INTR 0x40 39 XDIAG_IMUA_INTR 0x80 40 XDIAG_IMUB_INTR 0x100 41 XDIAG_IMUC_INTR 0x200 42 XDIAG_1553A_BIT 0x400 43 XDIAG_1553B_BIT 0x800 44 XDIAG_1553C_BIT 0x1000
18	0	8	EDC_COUNT	3	UInt8	1 to 255	The diagnostic test execution repetition count.
19	0	8	EDC_RESERVED	4	UInt8	None	Reserved.

3.2.3.3.1.2 Start Operational Software (GO)

The GO command will instruct the boot software to execute the extended diagnostics and then load and execute the operational code. The operational code will be loaded from EEPROM.

Name: GO

Command ID: 0x52

Task: BOOT_TASK

Constraints: This command is valid only when the ISC is executing the boot monitor (CMD_SUBID=NORMAL, BYPASS, DIAG or JUMP) or when the ISC is executing the extended diagnostics (CMD_SUBID=DIAG_HALT). The NORMAL and BYPASS subtypes are for normal FSW mode change from Boot to operational state and are not regarded as anomaly resolution requests.

SCS: False

Boot: True

Operational: False

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 7

Interface Definition 3-7 GO

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xB	Command routing code for BOOT_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x52	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - NORMAL 2 - BYPASS 3 - DIAG 4 - DIAG_HALT 5 - JUMP	Command packet sub-identifier. 1) NORMAL will cause the boot monitor to execute the extended diagnostics once. The operational software will execute upon successful completion of the diagnostics. If the diagnostics fail then control will return to the boot monitor. 2) BYPASS will execute the operational software without executing the extended diagnostics. 3) DIAG will execute the extended diagnostics repeatedly until a DIAG_HALT is issued. 4) DIAG_HALT will terminate the extended diagnostics and return the ISC to the boot monitor. 5) JUMP CPU execution to location specified in GO_JUMP_ADDR.
10	0	32	GO_JUMP_ADDR	1	UInt32	As defined in the ISC memory map in Appendix Table H-1	Address to jump to when CMD_SUBID is JUMP.

3.2.3.3.2 CAT

3.2.3.3.2.1 Control Event Processing (EVENT_CTL)

The event control command is used to control the distribution of event information. Events are distributed to the downlink in the form of summary status bits and event messages. Events are distributed internally for logging and command sequence initiation.

This command can be used to clear a single summary status bit or clear all summary status bits. Events will always be recorded into the event log. However, this command can be used to enable or inhibit the downlink of a single or all event messages. Disabled events are not persistent across ISC reboots. Events disabled for downlink must be disabled again once the ISC reboot completes.

Name: *EVENT_CTL*

Command ID: *0x4B*

Task: *MEM_MGR*

Constraints: *Undefined*

SCS: *True*

Boot: *True*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 7

Interface Definition 3-8 EVENT_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x4B	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - CLEAR 2 - DIS_DL 3 - ENA_DL	Command packet sub-identifier. 1) Clear will clear one or all status summary bits. 2) Disable downlink will prevent the spacecraft event from being reported in the downlink. Spacecraft events are still forwarded to telemetry processing and logged. 3) Enable downlink will cause the selected spacecraft event to be reported in the downlink.
10	0	16	EVENT_SSB	1	UInt16	None	Status summary bit identification. If this parameter is specified as all 1s (0xFFFF) then the request will be applied to all status summary bits. It is only referenced if the CMD_SUBID is set to CLEAR. It is ignored in all other cases.
12	0	16	EVENT_SCE	2	UInt16	0xFFFF - all spacecraft events	This parameter specifies which spacecraft event is enabled or disabled for downlink. If this parameter is specified as all 1s (0xFFFF) then the request will be applied to all spacecraft events. It is only referenced if the CMD_SUBID is set to DIS_DL or ENA_DL. It is ignored in all other cases.

3.2.3.3.2.2 Log Control (LOG_CTL)

The log control command is used to control logging.

This command can be used to clear a single summary status bit or clear all summary status bits. Events will always be recorded into the event log. However, this command can be used to enable or inhibit the downlink of a single or all event messages. Disabled events are not persistent across ISC reboots. Events disabled for downlink must be disabled again once the ISC reboot completes.

Name: LOG_CTL

Command ID: 0x4D

Task: MEM_MGR

Constraints: Dump will stop data logging to the selected log. Clear request is only valid for a stopped log. While a log is being dumped STOP, START, and CLEAR commands are not allowed.

SCS: True

Boot: False

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Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length:23

Interface Definition 3-9 LOG_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	23	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x4D	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - STOP 2 - START_SOF 3 - START_OOF 4 - CLEAR 5 - DUMP 6 - DUMP_COMPRESSED	Command packet sub-identifier. 1) STOP will disable data logging. 2) START_SOF will enable data logging until the log is full (stop on full). 3) START_OOF will enable data logging indefinitely (overwrite on full). The oldest data is overwritten. 4) CLEAR will clear the contents of the log. 5) DUMP will send the selected portion of the log to the ground. The selected portion is based on the start and end times. 6) DUMP will compress and send the selected portion of the log to the ground. The selected portion is based on the start and end times.
10	0	64	LOGC_START	1	Time	Valid GPS time	This parameter is only valid if the CMD_SUBID is DUMP. The start time is used to filter the amount of log data that will be downlinked. A start time of 0 will dump from the beginning of the log.
18	0	64	LOGC_END	2	Time	Valid GPS time	This parameter is only valid if the CMD_SUBID is DUMP. The end time is used to filter the amount of log data that will be downlinked. An end time of 0 will dump to the end of the log.
26	0	16	LOGC_SEL	3	UInt16	0 - INVALID 1 - TELEM_LOG 2 - EVT_LOG 3 - CMD_LOG 4 - SCS_LOG 5 - STDOUT_LOG 6 - DIAG_LOG	Log to perform the operation on. 0) Invalid 1) Telemetry Log 2) Event Log 3) Command Log 4) SCS Log 5) STDOUT Log 6) Diagnostics Log
28	0	8	LOGC_NUM_COPIES	4	UInt8	None	This parameter is only valid if the CMD_SUBID is DUMP. Number of copies to dump. Zero means continuous dumps.
29	0	8	LOGC_SPARE	5	UInt8	None	Reserved.

3.2.3.3.2.3 No Operation (NOOP)

The no operation command is received and recognized by all flight software tasks (directed by the routing code). This command causes no action to be taken by the task except for normal acknowledgement of command receipt and execution.

Name: *NOOP*

Command ID: *0x4E*

Task: *ANY_TASK*

Constraints: *When the boot monitor is active, the route code should be set to zero. The NOOP command can not be sent from a Stored Command Sequence routed to the Command Processing Task (CMD_PROC_TASK).*

SCS: *True*

Boot: *True*

Operational: *True*

Maximum Execution Time (seconds): *5*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *3*

Interface Definition 3-10 NOOP

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	Any. See Table 3-4 Application Process ID Assignments	Command routing code.
4	0	16	PACKET_LENGTH	None	UInt8	3	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x4E	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved.

3.2.3.3.2.4 Return Link Bit Rate Control (RL_BR_CTL)

The return link bit rate control command is used to set the downlink bit rate.

Name: *RL_BR_CTL*

Command ID: *0x63*

Task: *TLM_DOWNLINK_TASK*

Constraints: *Undefined*

SCS: *True*

Boot: True
Operational: True
Maximum Execution Time (seconds): 1
Minimum Delay Between Commands (seconds): 0.15
Packet Length:5

Interface Definition 3-11 RL_BR_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1C	Command routing code for TLM_DOWNLINK_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	5	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x63	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved
10	0	16	RLBC_BIT_RATE	1	UInt16	None	Desired downlink bit rate.

3.2.3.3.2.5 Return Link Format Control (RL_FORMAT_CTL)

The return link format control command is used to set the target ratios of each VCDU used to determine the number of spacecraft events, memory download, uplink status and regular telemetry packets in each VCDU.

Name: RL_FORMAT_CTL
Command ID: 0x59
Task: TLM_DOWNLINK_TASK
Constraints: The sum of the three numbers must not be more than 100, but can be less. Commutation list gets the rest of the VCDU.
SCS: True
Boot: False
Operational: True
Maximum Execution Time (seconds): 1
Minimum Delay Between Commands (seconds): 0.15
Packet Length:5

Interface Definition 3-12 RL_FORMAT_CTL

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1C	Command routing code for TLM_DOWNLINK_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	5	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x59	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved
10	0	8	RLFC_EVENT_RATIO	1	UInt8	0 to 90	Ratio used to determine number of spacecraft event packets in a VCDU.
11	0	8	RLFC_MEM_RATIO	2	UInt8	0 to 90	Ratio used to determine number of memory downlink packets in a VCDU.

3.2.3.3.2.6 SCL Tokens (SCL_TOKENS)

The SCS_CTL command interface should be normal interface for controlling the SCL Inference engine. The SCS_CTL provides the required command filter for nominal spacecraft operation. Only planned commands are accepted and processed by the SCS_CTL interface. Erroneous commands are rejected. In the exceptional situation, where the SCS_CTL filter becomes restrictive to operations, the SCL_TOKENS command may be used. The SCL_TOKENS provides an unfiltered command interface to the SCL inference engine, enabling all of the SCL features to be utilized. The SCL Token language is used directly in the SCL_TOKENS command string. This command passes an SCL token string directly to SCL.

Name: *SCL_TOKENS*

Command ID: *0x4C*

Task: *CMD_PROC_TASK*

Constraints: *The SCL token string must be 96 characters or less.*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length:*99*

Interface Definition 3-13 SCL_TOKENS

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xD	Command routing code for CMD_PROC_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	99	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x4C	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
							0) Reserved.
10	0	16	SCL_TOKENS_DATA	1	UInt16	Length of token stream must be 96 bytes or less.	SCL token data.

3.2.3.3.2.7 Stored Command Sequence Control (SCS_CTL)

The stored command sequence control request is used to control the stored command activities. This command can be used to disable, enable, delete, execute, schedule or abort a stored command function.

Name: SCS_CTL

Command ID: 0x4F

Task: CMD_PROC_TASK

Constraints: 1) The normal sequence for the SCS real-time engine is:

- a) Make sure the SCS real-time engine is stopped.
- b) Upload scripts and rules.
- c) Perform object select.
- d) Enable scripts and rules.

SCS: False

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 25

Interface Definition 3-14 SCS_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xD	Command routing code for CMD_PROC_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	25	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x4F	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - START 2 - STOP 3 - PAUSE 4 - RESUME 5 - SCHEDULE_ABS	Command packet sub-identifier. 1) Start SCS real-time engine and telemetry processing. 2) Stop SCS real-time engine and telemetry processing. Cancel pending scripts and rules in the real-time engine, but do not unload scripts/rules from memory.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						6 - SCHEDULE_REL 7 - CANCEL 8 - ENABLE 9 - DISABLE 10 - REMOVE_SCS 11 - REMOVE_DB 12 - CLEAN	3) Pause real-time engine and telemetry processing. 4) Resume paused real-time engine and telemetry processing. 5) Schedule absolute will execute the script at the requested time. (The script is scheduled according to an absolute time). 6) Schedule relative will execute the script in the requested interval. (The script is scheduled in a delta time or relative time). 7) Cancel will stop a currently executing script or cancel a scheduled script. In the case of a rule, it will become deactivated. Cancel does not affect enable flags nor will it unload the given script or rule. 8) Enable an individual script or rule. Rules are activated after being enabled. However, scripts still need to be scheduled. Specifying 0xFFFF for the SCS_ID will activate all scripts and rules. 9) Inhibit an individual scheduled script or rule. Disabling scripts that are already scheduled, pending, or executing causes their threads to terminate. Rules are put into a deactivated state. 10) Remove a specified script from scheduler and memory. Rules can not be removed using this command since this would invalidate rule chain lists. 11) You may only remove decom elements. You may not remove database sensors or database derived elements. 12) Stops processing as in STOP and unloads all scripts, rules and rule links from memory. SCS telemetry database is maintained, however.
10	0	64	SCS_TIME	1	Time	Valid GPS time or delta time.	An absolute or relative time. Used when the SCS control function is schedule absolute or schedule relative. If the CMD_SUBID is SCHEDULE_ABS, the specified Time value must be in later than the current time (in the future) or the command will be rejected. This parameter is only valid when the CMD_SUBID is SCHEDULE_ABS or SCHEDULE_REL and is ignored otherwise.
18	0	64	SCS_INTERVAL	2	DeltaTime	Valid cycle period time.	Execute specified script at this time interval. A zero SCS_INTERVAL will cause the script to execute only once. A non-zero SCS_INTERVAL will cause the script to execute cyclicly. The exact number of cycles depends on the SCS_EXECUTE_COUNT parameter. If SCS_EXECUTE_COUNT is zero, the script will cycle for ever. If SCS_EXECUTE_COUNT is non-zero, the script will execute SCS_EXECUTE_COUNT times. SCS_INTERVAL is intended for relative scheduling only. If a script is scheduled in absolute time with a non-zero SCS_INTERVAL, the scheduling is converted to an equivalent relative scheduling.
26	0	16	SCS_ID	3	UInt16	0 to 699	Stored command sequence or telemetry database entry identifier. A value of 0xFFFF will apply command to all scripts or rules. This parameter is only valid when the CMD_SUBID is CANCEL, ENABLE, DISABLE, REMOVE_SCS, REMOVE_DB, SCHEDULE_ABS or SCHEDULE_REL and is ignored otherwise. A zero script SCS_ID is reserved for the startup script (a startup script is automatically invoked upon RTE startup). A zero database element SCS_ID should never be specified.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
28	0	16	SCS_PRIORITY	4	UInt16	1 to 31	Script priority. The highest priority is 31; the lowest priority is 1. Zero not allowed in SCL. This parameter is only valid when the CMD_SUBID is SCHEDULE_ABS or SCHEDULE_REL and is ignored otherwise.
30	0	16	SCS_EXECUTE_COUNT	5	UInt16	None	Number of times to execute script. When the value for this parameter is zero, and the value for SCS_INTERVAL is non-zero, the script will repeat endlessly. This parameter is only valid when the CMD_SUBID is SCHEDULE_ABS or SCHEDULE_REL and is ignored otherwise.

3.2.3.3.2.8 Set Authenticate Count (SET_AUTH)

This command is used to set the ISC authenticate count to the requested value. The value provided will show up in the next occurrence of the authentication count in the telemetry frame.

Name: SET_AUTH

Command ID: 0x50

Task: CMD_UPLINK_TASK

Constraints: Undefined

SCS: False

Boot: True

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 5

Interface Definition 3-15 SET_AUTH

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xC	Command routing code for FWL_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	5	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x50	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved.
10	0	16	AUTH	1	UInt16	0 to 65535	Authenticate count to be used for the next command.

3.2.3.3.2.9 Software Diagnostics Request (SWDIAG_REQ)

This command is used to request a single packet to be inserted into the software diagnostic return link data stream. The software diagnostic return link data stream contains a sequence of software diagnostic packets. The sequence is determined by a packet list defined in the software diagnostic list object (the default list is loaded at operational code startup). This command requests the insertion of a single software diagnostic packet inserted into the software diagnostic return link sequence one or more times. The packet(s) will be downlinked at the earliest opportunity. The requested software diagnostic packet is included in the software diagnostic return link data stream, if and only if the packet content is not marked as stale in the Return Link Table.

Name: SWDIAG_REQ

Command ID: 0x51

Task: TLM_DOWNLINK_TASK

Constraints: Undefined

SCS: True

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 7

Interface Definition 3-16 SWDIAG_REQ

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1C	Command routing code for TLM_DOWNLINK_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x51	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - COUNT 2 - CONTINUOUS 3 - STOP	Command packet sub-identifier. 1) Downlink using specified count 2) Downlink continuously 3) Stop downlinking
10	0	8	SDR_PKT_ID	1	UInt8	Refer to Sections F-1 and F-2	Requested Packet ID.
11	0	8	SDR_PKT_SUBID	2	UInt8	Refer to Sections F-1 and F-2	Requested Packet Sub-ID.
12	0	16	SDR_PKT_CNT	3	UInt16	None	Number of times requested packet is to be downlinked. Only used when CMD_SUBID is COUNT. When no immediate diagnostic packets are requested, the software diagnostic packet sequence object is used to determine which packets will be downlinked.

3.2.3.3.3 GNC

3.2.3.3.3.1 Attitude Adjustment (ATT_ADJ)

The attitude adjustment command provides a means to modify the estimate of the selected Kalman filter attitude by a delta quaternion, and to set the filter's attitude valid flag to TRUE. The resulting quaternion will then be used for attitude determination without restarting the attitude determination logic. The delta quaternion is applied to the current attitude estimate

Name: ATT_ADJ

Command ID: 0x66

Task: ADAC_TASK

Constraints: A reboost maneuver must not currently be enabled. The AA_DQUAT values must be a valid quaternion, and the angle the quaternion represents must be less than the OAF_ATT_ADJUST_CMD_MAX parameter value in the OBJ_AD_FDIR object.

SCS: False

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 19

Interface Definition 3-17 ATT_ADJ

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1D	Command routing code for ADAC_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	19	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x66	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - PRIMARY 2 - SECONDARY 3 - ALL 4 - BYPASS	Command packet sub-identifier. 1) Primary Kalman Filter Select. 2) Secondary Kalman Filter Select. 3) Select All Three Filters. 4) Bypass Filter Select.
10	0	32	AA_DQUAT_X	1	leee32	-1 to 1	Delta quaternion X component.
14	0	32	AA_DQUAT_Y	2	leee32	-1 to 1	Delta quaternion Y component.
18	0	32	AA_DQUAT_Z	3	leee32	-1 to 1	Delta quaternion Z component.
22	0	32	AA_DQUAT_S	4	leee32	-1 to 1	Delta quaternion scalar.

3.2.3.3.3.2 Attitude Reset (ATT_RESET)

The attitude reset command forces the selected Kalman filter to reset its estimated attitude and IMU drift rate to those contained in the command, and set its attitude valid flag to FALSE. The Attitude Determination initialization process for the selected filter will then be started with these values.

Name: *ATT_RESET*

Command ID: *0x67*

Task: *ADAC_TASK*

Constraints: *The AR_QUAT fields of the message must represent a valid quaternion.*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *31*

Interface Definition 3-18 ATT_RESET

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1D	Command routing code for ADAC_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	31	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x67	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - PRIMARY 2 - SECONDARY 3 - ALL 4 - BYPASS	Command packet sub-identifier. 1) Primary Kalman Filter Select. 2) Secondary Kalman Filter Select. 3) Select All 3 Filters. 4) Bypass Filter Select.
10	0	32	AR_DRIFT_X	1	leee32	Magnitude must be less than the OAF_ATT_RESET_CMD_MAx parameter value in OBJ_AD_FDIR object.	X Axis drift rate (rad/sec)
14	0	32	AR_DRIFT_Y	2	leee32	Magnitude must be less than the OAF_ATT_RESET_CMD_MAx parameter value in OBJ_AD_FDIR object.	Y Axis drift rate (rad/sec)
18	0	32	AR_DRIFT_Z	3	leee32	Magnitude must be less than the OAF_ATT_RESET_CMD_MAx	Z Axis drift rate (rad/sec)

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						X parameter value in OBJ_AD_FDIR object.	
22	0	32	AR_QUAT_1	4	leee32	-1 to 1	Quaternion X component.
26	0	32	AR_QUAT_2	5	leee32	-1 to 1	Quaternion Y component.
30	0	32	AR_QUAT_3	6	leee32	-1 to 1	Quaternion Z component.
34	0	32	AR_QUAT_4	7	leee32	-1 to 1	Quaternion scalar.

3.2.3.3.3 Set IMU Drift Rates (IMU_DRIFT)

The set IMU drift rates command forces new IMU drift rates for the selected Kalman filter.

Name: *IMU_DRIFT*

Command ID: *0x6B*

Task: *ADAC_TASK*

Constraints: *Undefined*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *15*

Interface Definition 3-19 IMU_DRIFT

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1D	Command routing code for ADAC_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	15	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x6B	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - PRIMARY 2 - SECONDARY 3 - BYPASS 4 - ALL	Command packet sub-identifier. 1) Primary Kalman Filter Select. 2) Secondary Kalman Filter Select. 3) Bypass Filter Select. 4) Select all 3 Filters.
10	0	32	ID_DRIFT_X	1	leee32	Magnitude must be less than the OAF_ATT_RESET_CMD_MA	X Axis drift rate (rad/sec)

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						X parameter value in OBJ_AD_FDIR object.	
14	0	32	ID_DRIFT_Y	2	leee32	Magnitude must be less than the OAF_ATT_RESET_CMD_MA X parameter value in OBJ_AD_FDIR object.	Y Axis drift rate (rad/sec)
18	0	32	ID_DRIFT_Z	3	leee32	Magnitude must be less than the OAF_ATT_RESET_CMD_MA X parameter value in OBJ_AD_FDIR object.	Z Axis drift rate (rad/sec)

3.2.3.3.4 IMU Select (IMU_SELECT)

The IMU select command selects which IMU is primary and which is secondary. To operate with only 1 IMU, set the secondary to NONE.

Name: *IMU_SELECT*

Command ID: *0x68*

Task: *ADAC_TASK*

Constraints: *Do not use powered off IMUs. The IMU_SEL_PRIMARY and IMU_SEL_SECONDARY values can not be the same.*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *7*

Interface Definition 3-20 IMU_SELECT

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1D	Command routing code for ADAC_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x68	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved
10	0	8	IMU_SEL_PRIMARY	1	UInt8	0 - INVALID	Identifies which IMU is primary.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						1 - IMU_A 2 - IMU_B 3 - IMU_C 255 - INVALID	0) Invalid 1) IMU A 2) IMU B 3) IMU C 255) Invalid
11	0	8	IMU_SEL_SECONDARY	2	UInt8	0 - NONE 1 - IMU_A 2 - IMU_B 3 - IMU_C 255 - INVALID	Identifies which IMU is secondary. To operate with only 1 IMU, set the secondary to NONE. 0) None 1) IMU A 2) 2 - IMU B 3) 3 - IMU C 255) 255 - Invalid
12	0	8	IMU_SEL_BYPASS	3	UInt8	0 - NOT_BYPASS 1 - BYPASS 255 - INVALID	If set to bypass, the Bypass Filter attitude will be the output of the Attitude Determination process. 0) Do Not Bypass 1) Bypass 255) 255 - Invalid
13	0	8	IMU_SEL_SPARE	4	UInt8	None	Reserved.

3.2.3.3.4 HW

3.2.3.3.4.1 Instrument Configuration (INSTR_CFG)

The instrument configuration command is TBS.

Name: *INSTR_CFG*

Command ID: *0x65*

Task: *BKGRND_DIAGS_TASK*

Constraints: *Undefined*

SCS: *True*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.15*

Packet Length: *7*

Interface Definition 3-21 INSTR_CFG

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xA	Command routing code for BKGRND_DIAGS_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x65	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved
10	0	32	IC_MASK	1	UInt32	None	TBS

3.2.3.3.4.2 Instrument Control (INSTR_CTL)

The instrument control command is TBS.

Name: INSTR_CTL

Command ID: 0x64

Task: BKGRND_DIAGS_TASK

Constraints: Undefined

SCS: True

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.15

Packet Length: 3

Interface Definition 3-22 INSTR_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xA	Command routing code for BKGRND_DIAGS_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	3	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x64	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved

3.2.3.3.4.3 RIU Command (RIU)

The remote interface unit command is used to execute a high level, low level, serial, or serial list hardware command accessible via the RIU.

Name: *RIU*

Command ID: *0x6E*

Task: *LOCAL_BUS_MGR*

Constraints: *Undefined*

SCS: *True*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.088*

Packet Length: *9*

Interface Definition 3-23 RIU

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1E	Command routing code for LOCAL_BUS_Q
4	0	16	PACKET_LENGTH	None	UInt8	9	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x6E	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - RIU_1 2 - RIU_2	Command packet sub-identifier. 1) RIU 1 Select 2) RIU 2 Select
10	0	5	RIU_SER_WC	1	5BitUInt16	0, 1, or 2	RIU Serial word count. This word count must be 1 when a serial command is issued, 0 when a high or low level command is issued and must be a value of 2 when a command list is issued.
10	5	2	RIU_CMD_TYPE	2	2BitUInt16	0 - SERIAL 1 - HIGH_LEVEL 2 - LOW_LEVEL 3 - SERIAL_LIST	Type of RIU command to be issued. 0) Serial RIU command issued 1) High Level RIU command issued 2) 10 - Low Level RIU command issued 3) 11 - Serial List RIU command issued
10	7	9	RIU_CMD_CHAN	3	9BitUInt16	0 - 127 for high level commands 0 - 63 for low level commands 0 - 15 for serial commands or serial list commands	Command channel select. The range of valid channels varies based on the type of RIU command selected in the RIU_CMD_TYPE parameter.
12	0	16	RIU_SER_DATA_1	4	UInt16	None	RIU serial data word 1. Only used when the RIU_CMD_TYPE

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
							parameter value is serial or serial list. Otherwise, zero fill.
14	0	16	RIU_SER_DATA_2	5	UInt16	None	RIU serial data word 2. Only used when the RIU_CMD_TYPE parameter value is serial or serial list. Otherwise, zero fill.

3.2.3.3.5 RM

3.2.3.3.5.1 Background Diagnostic Control (BACK_DIAG_CTL)

The background diagnostic control command is used to control the execution of the ISC background diagnostics. The diagnostics can be enable or disabled for background processing. The background diagnostics will execute at the lowest priority and will consume the idle time of the processor. The background diagnostics will cycle through the enabled tests one by one. If no tests are enabled for background processing then the background diagnostic task will act as the idle task.

Name: *BACK_DIAG_CTL*

Command ID: *0x41*

Task: *BKGRND_DIAGS_TASK*

Constraints: *Undefined*

SCS: *True*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *5*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *7*

Interface Definition 3-24 BACK_DIAG_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xA	Command routing code for BKGRND_DIAGS_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x41	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - BDC_SUB_DIS 2 - BDC_SUB_ENA	Command packet sub-identifier. 1) Clear selected diagnostic for continuous background execution. 2) Mark select diagnostic from continuous background execution.
10	0	32	BDC_MASK	1	UInt32	None	Diagnostic mask. This mask is used to enable or disable the background diagnostics. Bit 0 - Memory Scrubbing.

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
							Bit 1 - Flight Object Scrubbing. Bit 2 - Nonvolatile image checksumming. Bit 3 - State of Health processing. Bit 4 - Data cache invalidation. Bit 5 - Instruction cache invalidation. Bit 6: Start instrumentation ring (if instrumentation compiled into code) Bit 7: Stop instrumentation ring (if instrumentation compiled into code) Bit 8: Start VME instrumentation (if instrumentation compiled into code) Bit 9: Stop VME instrumentation (if instrumentation compiled into code) Bit 10: Trigger MTV (if instrumentation compiled into code)

3.2.3.3.5.2 Cancel Memort Dump (CANCEL_MEM_DUMP)

The cancel memory dump command is used to inactivate the current dump.

Name: CANCEL_MEM_DUMP

Command ID: 0x58

Task: MEM_MGR

Constraints: Undefined

SCS: True

Boot: True

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 15

Packet Length: 3

Interface Definition 3-25 CANCEL_MEM_DUMP

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	3	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x58	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved

3.2.3.3.5.3 Interrupt Control (INT_CTL)

Interrupt control. Use the IC_SELECT to enable or disable a selected interrupt.

Name: INT_CTL

Command ID: 0x42

Task: HW_MGR

Constraints: Undefined

SCS: False

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 5

Interface Definition 3-26 INT_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x1F	Command routing code for HW_MGR_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	5	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x42	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - DISABLE 2 - ENABLE	Command packet sub-identifier. 1) Use the interrupt select as a disable mask. 2) Use the interrupt select as an enable mask.
10	0	16	IC_SELECT	1	UInt16	0 - ISR_SRC_R3000_SPURIOUS 1 - ISR_SRC_FPU_SPURIOUS 2 - ISR_SRC_RHC3001_SPURIOUS 3 - ISR_SRC_USR_INT_0 4 - ISR_SRC_USR_INT_1 5 - ISR_SRC_USR_INT_2 6 - ISR_SRC_USR_INT_3 7 - ISR_SRC_USR_INT_4 8 - ISR_SRC_DRD_ERROR 9 - ISR_SRC_IRD_ERROR 10 - ISR_SRC_BUS_TIMEOUT 11 - ISR_SRC_UART_TX_READY 12 - ISR_SRC_UART_RX_READY 13 - ISR_SRC_UART_TX_OVFLW 14 - ISR_SRC_UART_RX_OVFLW	Interrupt select.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						15 - ISR_SRC_DMA_DST_DONE 16 - ISR_SRC_DMA_SRC_DONE 17 - ISR_SRC_DMA_DST_ERR 18 - ISR_SRC_DMA_SRC_ERR 19 - ISR_SRC_SP_RCV_READY 20 - ISR_SRC_SP_RCV_OVFLW 21 - ISR_SRC_SP_XMT_READY 22 - ISR_SRC_SP_XMT_OVFLW 23 - ISR_SRC_MBUS_WR_BERR 24 - ISR_SRC_TIMER_1_EOC 25 - ISR_SRC_TIMER_0_EOC 26 - ISR_SRC_SP_RCV_PARITY_ERR 27 - ISR_SRC_SP_RCV_PKT_CMPLT 28 - ISR_SRC_EDAC_ERROR 29 - ISR_SRC_DMA2_XFER_DONE 30 - ISR_SRC_DMA2_DST_ERR 31 - ISR_SRC_DMA2_SRC_ERR 32 - ISR_SRC_TIMER_3_EOC 33 - ISR_SRC_TIMER_2_EOC 34 - ISR_SRC_CDU_VIRQ 35 - ISR_SRC_CDUA_PKT_RCVD 36 - ISR_SRC_CDUB_PKT_RCVD 37 - ISR_SRC_TRNS_127 38 - ISR_SRC_TRNS_255 39 - ISR_SRC_TG_VIRQ 40 - ISR_SRC_EPOCH_A 41 - ISR_SRC_EPOCH_B 42 - ISR_SRC_ADAC_A 43 - ISR_SRC_ADAC_B 44 - ISR_SRC_IMU_VIRQ 45 - ISR_SRC_IMUA_CLOSE 46 - ISR_SRC_IMUA_FULL 47 - ISR_SRC_IMUA_OVERFLOW 48 - ISR_SRC_IMUB_CLOSE 49 - ISR_SRC_IMUB_FULL 50 - ISR_SRC_IMUB_OVERFLOW 51 - ISR_SRC_IMUC_CLOSE 52 - ISR_SRC_IMUC_FULL 53 - ISR_SRC_IMUC_OVERFLOW 54 - ISR_SRC_EXTERN_VIRQ 55 - ISR_SRC_UNDERVOLTA 56 - ISR_SRC_UNDERVOLTB 57 - ISR_SRC_EXTERNAL5	

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						58 - ISR_SRC_RCE_VIRQ 59 - ISR_SRC_RCEA 60 - ISR_SRC_RCEB 61 - ISR_SRC_STC_VIRQ 62 - ISR_SRC_STC_FRAME_A 63 - ISR_SRC_STC_LINE_ERR_A 64 - ISR_SRC_STC_FRAME_ERR_A 65 - ISR_SRC_STC_OVERRUN_A 66 - ISR_SRC_STC_FRAME_B 67 - ISR_SRC_STC_LINE_ERR_B 68 - ISR_SRC_STC_FRAME_ERR_B 69 - ISR_SRC_STC_OVERRUN_B 70 - ISR_SRC_1553_VIRQ 71 - ISR_SRC_US_1553_MSG_A 72 - ISR_SRC_US_1553_MSG_B 73 - ISR_SRC_US_1553_MSG_C 74 - ISR_SRC_US_1553_YF_A 75 - ISR_SRC_US_1553_YF_B 76 - ISR_SRC_US_1553_YF_C	

3.2.3.3.5.4 Memory Block Load Enable (MEM_BLE)

The memory block load enable command is used to configure the FSC into a block load mode. In this mode the FSC will expect a sequence of load packets to follow this command. These load packets are used to load data into a selected address range of EEPROM or RAM. The memory block load enable command describes where data is to be loaded, how many load packets will be needed, how many bytes are in the total memory load data, and the Sum to Zero checksum of the data to be loaded. Once a memory block load is successfully enabled, the subsequent load commands will result in the immediate loading of all successful data blocks up to the point of normal or abnormal block load termination. Once all data blocks are loaded, a Sum to Zero checksum will be calculated on the region and compared to the checksum provided in the command. Once this command has been accepted by the flight software, only load commands are expected to follow for the number of packets detailed in the MEM_BLE command. If any FSW commands are detected before all load packets have been received, the load will be aborted, and the FSW command received will get executed.

Name: *MEM_BLE*

Command ID: *0x3E*

Task: *MEM_MGR*

Constraints: *Address and length must be a valid range in the FSC memory map for loading. Odd byte memory loads are allowed.*

SCS: *False*

Boot: *True*

Operational: *True*

Maximum Execution Time (seconds): 1
Minimum Delay Between Commands (seconds): 0.15
Packet Length: 17

Interface Definition 3-27 MEM_BLE

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	17	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x3E	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - EEPROM 2 - RAM	Command packet sub-identifier. 1) Load Memory into EEPROM. Refer to Appendix H for memory types. 2) Load Memory into RAM. Refer to Appendix H for memory types.
10	0	32	BLE_START_ADR	1	UInt32	As defined in the ISC memory map in Appendix Table H-1	The start address in memory to start loading the data. This value will be verified against the memory map built into the flight software.
14	0	32	BLE_NUM_BYTES	2	UInt32	As defined in the ISC memory map in Appendix Table H-1	he numbers of 8-bit bytes to be loaded at the provided start address. This value will be verified against the memory map built into the flight software.
18	0	32	BLE_PKT_COUNT	3	UInt32	0 to 65535	Number of load packets that will be required to load the data.
22	0	16	BLE_CHECKSUM	4	UInt16	None	The 16 bit sum-to-zero checksum of the entire memory load. This checksum will be validated after the last load packet is received. Memory data are written when received. Failure of the checksum will produce an event notification but will not cause any further modifications to the data loaded

3.2.3.3.5.5 Memory Block Load (MEM_BLOCK_LOAD)

The memory block load command is used to upload memory bytes.

Name: MEM_BLOCK_LOAD

Command ID: 0x56

Task: MEM_MGR

Constraints: Undefined

SCS: False

Boot: True

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.2

Packet Length: 1011

Interface Definition 3-28 MEM_BLOCK_LOAD

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	1011	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x56	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved
10	0	8	BLOCK_DATA	1	UInt8	None	Data bytes for the load. Variable length field.

3.2.3.3.5.6 Memory Dump (MEM_DUMP)

The memory control command is used to downlink EEPROM or RAM contents. Note: The subId does not process any differently between RAM and EEPROM, but only between compressed and not compressed. The start address and number of bytes determines what range of memory will be dumped. This range will determine the memory type.

Name: *MEM_DUMP*

Command ID: *0x43*

Task: *MEM_MGR*

Constraints: *Compressed dumps are not available during boot.*

SCS: *True*

Boot: *True*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *13*

Interface Definition 3-29 MEM_DUMP

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	13	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x43	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - EEPROM	Command packet sub-identifier.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						2 - RAM 3 - EEPROM_COMPRESS 4 - RAM_COMPRESS	1) Select EEPROM dump. 2) Select RAM dump. 3) Select compressed EEPROM dump. 4) Select compressed RAM dump.
10	0	32	MD_START_ADR	1	UInt32	As defined in the ISC memory map in Appendix Table H-1	Start address of the memory range.
14	0	32	MD_NUM_BYTES	2	UInt32	As defined in the ISC memory map in Appendix Table H-1	Number of bytes in the memory range.
18	0	8	MD_NUM_COPIES	3	UInt8	None	Number of copies to dump. Zero means continuous dumps.
19	0	8	MD_SPARE	4	UInt8	None	Reserved.

3.2.3.3.5.7 Object Block Load Enable (OBJ_BLE)

The object block load enable command is used to command the FSC into an object load mode. In this mode the FSC expect a sequence of load packets to follow the object block load enable command. These load packets are used to load data into a selected object. The object block load enable command will describe where the data are to be loaded, how many load packets will be needed, and how many bytes are in the total object load data.

Once an object block load is successfully enabled, the subsequent load commands will result in the immediate loading of data into the destination object area. The object content will reflect the loading of all successful data blocks up to the point of normal block load termination. If the object load is abnormally terminated, the object being loaded will be cleared and marked empty.

Name: *OBJ_BLE*

Command ID: *0x3F*

Task: *MEM_MGR*

Constraints: *Undefined*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.15*

Packet Length: *13*

Interface Definition 3-30 OBJ_BLE

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	13	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x3F	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved.
10	0	32	OLE_NUM_BYTES	1	UInt32	None	The number of 8-bit bytes to be loaded.
14	0	32	OLE_PKT_COUNT	2	UInt32	None	Number of load packets that will be required to load the data.
18	0	8	OLE_TYPE	3	UInt8	Refer to table B-1.	Type of Object to load.
19	0	8	OLE_SLOT	4	UInt8	1, 2, 3, 4, or 5, depending on the object. Refer to table B-1.	Object slot. This parameter will select which one of the n tables of the object type will be processed. Slot 0 is the default object and cannot be specified for this command.

3.2.3.3.5.8 Object Block Load (OBJ_BLOCK_LOAD)

The object block load command is used to upload the bytes of an object.

Name: OBJ_BLOCK_LOAD

Command ID: 0x55

Task: MEM_MGR

Constraints: Undefined

SCS: False

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.2

Packet Length: 1011

Interface Definition 3-31 OBJ_BLOCK_LOAD

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	1011	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x55	Command packet identifier.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved
10	0	8	BLOCK_DATA	1	UInt8	None	Data bytes for the load. Variable length field.

3.2.3.3.5.9 Object Control (OBJ_CTL)

The object control command is used to clear object contents, make an object ready for selection, or select a given object. Object control messages are only applied to objects that are not currently selected. The command will be rejected if the specified object is selected.

Name: *OBJ_CTL*

Command ID: *0x44*

Task: *MEM_MGR*

Constraints: *The CLEAR, READY, and SELECT CMD_SUBID values cannot be specified for an object that is in use (selected).*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length:*5*

Interface Definition 3-32 OBJ_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	5	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x44	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - CLEAR 2 - READY 3 - SELECT	Command packet sub-identifier. 1) Clear the contents of the object. The object must not be selected. 2) Mark the object ready for use, even if the object has failed reasonableness check. 3) Select specified object for use.
10	0	8	OC_TYPE	1	UInt8	Refer to table B-1.	Object ID. See object type values in Table B-1.
11	0	8	OC_SLOT	2	UInt8	For subid OBJ_CTL_CLEAR and OBJ_CTL_READY, 1, 2, 3, 4, 5 depending on OC_TYPE. For subid OBJ_CTL_SELECT, 0 is also	Object slot. This field will identify which one of the n tables of the object type will be processed. Slot 0 is the default object and cannot be specified when the CLEAR or READY subid are selected. Slot 0 can be specified for the SELECT subid.

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
						a valid value. See table B-1.	

3.2.3.3.5.10 Object Dump (OBJ_DUMP)

The object dump command is used to request a downlink of the selected object.

Name: *OBJ_DUMP*

Command ID: *0x46*

Task: *MEM_MGR*

Constraints: *Undefined*

SCS: *True*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *7*

Interface Definition 3-33 OBJ_DUMP

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x46	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SUB_RES	Command packet sub-identifier. 0) Reserved.
10	0	8	OD_TYPE	1	UInt8	Refer to table B-1.	Object ID. See object type values in Table B-1.
11	0	8	OD_SLOT	2	UInt8	0, 1, 2, 3, 4, 5 depending on OD_TYPE. See table B-1.	Object slot. This field will identify which one of the n tables of the object type will be processed.
12	0	8	OD_NUM_COPIES	3	UInt8	None	Number of copies to dump. Zero means continuous dumps.
13	0	8	OD_SPARE	4	UInt8	None	Reserved.

3.2.3.3.5.11 SCS Object Dump (SCS_DUMP_RESOURCE)

Dump stored command resource. The specified resource will be sent in telemetry in the memory dump data set. See section 4.2.17 Dump API for format of the resource dump.

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Name: SCS_DUMP_RESOURCE

Command ID: 0x53

Task: MEM_MGR

Constraints: Depending upon the project loaded, not all SCL resources can be dumped.

SCS: True

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 7

Interface Definition 3-34 SCS_DUMP_RESOURCE

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x12	Command routing code for MEM_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	7	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x53	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	0 - SCRIPT 1 - RULE 2 - DBRTE 3 - DBREC 4 - DBITEM 5 - FWD_LIST 6 - BWD_LIST 7 - MCCC_LIST 8 - DB_VTBL 9 - DB_COEF 10 - RULELIST 11 - TABLE_SCRIPT_RULE 12 - TABLE_DB	Command packet sub-identifier. 0) Dump specified script. 1) Dump specified rule. 2) Dump specified database RTE. 3) Dump specified database record. 4) Dump specified database item. 5) Dump specified forward list. 6) Dump specified backward list. 7) Dump specified MCCC list. 8) Dump specified database V table. 9) Dump specified database coefficient. 10) Dump specified rule list. 11) Dump specified table script rule. 12) Dump specified table database.
10	0	16	SDR_RESID	1	UInt16	None	SCL Resource id of desired dump item.
12	0	8	SDR_NUM_COPIES	2	UInt8	None	Number of copies to dump. Zero means continuous dumps.
13	0	8	SDR_SPARE	3	UInt8	None	Reserved.

3.2.3.3.5.12 System Reset (SYS_RESET)

The system reset command will cause the flight software on the commanded ISC to reboot the system and return to Boot Monitor. If the ISC is operating in Boot Monitor, the SYS_RESET Command executes a warm reset regardless of cmd_subid, the Boot source value, MUI_ISCRBC, is unmodified, and the Boot cause is reported in MUI_DIPBCA as 3 (ie. BOOT). If the ISC is operating in Operational Mode, the SYS_RESET Command executes a watchdog reset regardless of cmd_subid, the Boot source value, MUI_ISCRBC, is set to COMMANDED, and the Boot cause is reported in MUI_DIPBCA as 2 (ie. FSW).

Name: *SYS_RESET*

Command ID: *0x48*

Task: *CMD_UPLINK_TASK*

Constraints: *Undefined*

SCS: *False*

Boot: *True*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *3*

Interface Definition 3-35 SYS_RESET

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0xC	Command routing code for FWL_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	3	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x48	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - SUB_WARM_START 2 - SUB_WD 3 - SUB_COLD_START	Command packet sub-identifier. 1) Reboot to the warm start entry point. 2) Reboot to the watchdog reset entry point. 3) Reboot to the cold start entry point.

3.2.3.3.5.13 Task Manager (TASK_MGR)

The task manager command is used to disable or enable flight software processing tasks. The tasks are not informed of the control requests handled by the task manager.

Name: *TASK_MGR*

Command ID: *0x49*

Task: *TASK_MGR*

Constraints: *Undefined*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): *1*

Minimum Delay Between Commands (seconds): *0.015*

Packet Length: *5*

Interface Definition 3-36 TASK_MGR

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x18	Command routing code for TASK_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	5	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x49	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - REMOVE 2 - ADD 3 - SUSPEND 4 - RESUME	Command packet sub-identifier. 1) Remove Task from scheduler. 2) Add Task to scheduler 3) Suspend task scheduling for task. 4) Resume task scheduling for a task
10	0	8	TSKM_TASK_SEL	1	UInt8	13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK	Selected task. 13) Command Uplink Task 14) Command Processing Task 15) Telemetry Processing Task
11	0	8	TSKM_SPARE	2	UInt8	None	Reserved.

3.2.3.3.5.14 Task Request (TASK_REQ)

The task request command is issued to the specified task. A task request is used to request a task to perform a reset or shutdown.

Name: *TASK_REQ*

Command ID: *0x4A*

Task: *ANY_TASK*

Constraints: *A SHUTDOWN subid cannot be sent to TIME_MGR, CMDUPLINK_TASK, ADAC_TASK, ADAC_EXEC_TASK or REBOOST_TASK*

SCS: *False*

Boot: *False*

Operational: *True*

Maximum Execution Time (seconds): 5
Minimum Delay Between Commands (seconds): 0.015
Packet Length: 3

Interface Definition 3-37 TASK_REQ

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	Any. See Table 3-4 Application Process ID Assignments	Command routing code.
4	0	16	PACKET_LENGTH	None	UInt8	3	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x4A	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - RESET 2 - SHUTDOWN	Command packet sub-identifier. 1) Reset will cause a task to re-initialize and restart its processing from a known state. 2) Shutdown will cause a task to perform cleanup processing and to be removed from scheduler.

3.2.3.3.5.15 Time Control (TIME_CTL)

The set request will load the included absolute time as the new spacecraft time. The adjust command will adjust the spacecraft time by the provided delta value.

Name: TIME_CTL

Command ID: 0x47

Task: TIME_MGR

Constraints: Undefined

SCS: False

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 11

Interface Definition 3-38 TIME_CTL

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x19	Command routing code for TIME_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	11	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x47	Command packet identifier.
7	0	8	CMD_SUBID	None	UInt8	1 - SUB_SET 2 - SUB_ADJUST	Command packet sub-identifier. 1) Set absolute time. Limited from epoch to 40 years (Year 2020). 2) Adjust time. Limited to +- 1 Day.
10	0	64	TIMEC_TIME	1	Time	Must be a valid absolute or relative GPS time. For set absolute time, limited by OT_MIN_SET_TIME and OT_MAX_SET_TIME in OBJ_TIMEKEEPING. For adjust, absolute value must be less than OT_MAX_ADJUST in OBJ_TIMEKEEPING.	When the CMD_SUBID is SUB_SET, this value is an absolute GPS time. When the CMD_SUBID is SUB_ADJUST, this value is a GPS delta time.

3.2.3.3.5.16 Watchdog Manager Control (WATCHDOG_CTL)

The watchdog control command is used to add a task to or remove a specific, mission critical task from watchdog monitoring.

Name: WATCHDOG_CTL

Command ID: 0x54

Task: TIME_MGR

Constraints: Undefined

SCS: False

Boot: False

Operational: True

Maximum Execution Time (seconds): 1

Minimum Delay Between Commands (seconds): 0.015

Packet Length: 5

Interface Definition 3-39 WATCHDOG_CTL

Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
0	5	11	APID	None	UInt8	0x19	Command routing code for TIME_CMD_Q
4	0	16	PACKET_LENGTH	None	UInt8	5	Command packet length.
6	0	8	CMD_ID	None	UInt8	0x54	Command packet identifier.

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Byte Offset	Bit Offset	# of Bits	Field Name	Parameter Number	Data Type	Constraints	Description
7	0	8	CMD_SUBID	None	UInt8	1 - WDOG_CTL_SUB_REMOVE 2 - WDOG_CTL_SUB_ADD	Command packet sub-identifier. 1) Remove task from watchdog processing. 2) Add task to watchdog processing.
10	0	8	WDOG_CTL_TASK	1	UInt8	0 - INVALID 1 - ADAC_TASK 2 - ADAC_EXEC_TASK 3 - REBOOST_TASK 4 - LOCAL_BUS_MGR 255 - INVALID	Task to be added or removed from watchdog processing. 0) Invalid 1) ADAC_TASK 2) ADAC_EXEC_TASK 3) REBOOST_TASK 4) LOCAL_BUS_MGR 255) Invalid
11	0	8	WDOG_SPARE	2	UInt8	None	Reserved.

3.2.3.4 Detailed Flight Software (FSW) Parameter Block Definitions

This subsection defines each parameter block in detail. Parameter blocks are loaded using the OBJ_LOAD command. Each parameter block definition contains a description, the command characteristics, and the format of both the common header fields and the unique parameters stored in the application data field of the command packet. Protocol requirements and constraints are provided where applicable.

The following characteristics will be identified for each command:

- **Name:** The parameter block name.
- **ID:** The parameter block identifier
- **Task:** The flight software component that will utilize the parameters.
- **Constraints:** Identifies constraints on parameter block usage.
- **Slots:** The number of storage slots.
- **Packet Length:** The value stored in the length field of the command packet header. This is the number of bytes in the secondary header and the application data field minus 1.

3.2.3.4.1 Attitude Control Parameter Block (OBJ_AC_PARAM)

The attitude control parameter block contains the attitude control function parameters.

Name: OBJ_AC_PARAM

ID: 0x16

Task: CMD_PROC_TASK

Constraints: OAP_RATE_MAX - OAP_RATE_MIN must be greater than or equal to 0.017.

Slots: 5

Packet Length: 251

Interface Definition 3-40 OBJ_AC_PARAM

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Units	Constraints	Dimensions	Description
0	0	8	OBJ_ID	UInt8		22		Object ID.
1	0	24	OBJ_SPARE	UInt8		0	(3)	Spare field - must be zero.
4	0	16	OBJ_VERSION	UInt16		None		User defined version number.
6	0	16	OBJ_CHECKSUM	UInt16		None		Sum to zero checksum. When all words (16 bits) of the object (including the checksum) are added (carry ignored) the result will be zero.
8	0	64	OAP_HALF_DEADBAND	leee64	rad	0.002 <= OAP_HALF_DEADBAND < 0.02	(3)(2)	Attitude control half deadbands for normal

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Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Units	Constraints	Dimensions	Description
								and reboost modes [Dimension 1 Enumeration] 0 - X_AXIS 1 - Y_AXIS 2 - Z_AXIS [Dimension 2 Enumeration] 0 - NORMAL 1 - REBOOST
56	0	64	OAP_SLOPE	leee64	1/sec	0.001 <= OAP_SLOPE	(3)(2)	Slopes of switching curve for normal and reboost [Dimension 1 Enumeration] 0 - X_AXIS 1 - Y_AXIS 2 - Z_AXIS [Dimension 2 Enumeration] 0 - NORMAL 1 - REBOOST
104	0	64	OAP_RATE_MAX	leee64	rad/sec	0.00017 <= OAP_RATE_MAX < 0.017	(3)(2)	Rate maxima for normal and reboost [Dimension 1 Enumeration] 0 - X_AXIS 1 - Y_AXIS 2 - Z_AXIS [Dimension 2 Enumeration] 0 - NORMAL 1 - REBOOST
152	0	64	OAP_RATE_MIN	leee64	rad/sec	0.00017 <= OAP_RATE_MIN < 0.017	(3)(2)	Rate minima for normal and reboost [Dimension 1 Enumeration] 0 - X_AXIS 1 - Y_AXIS 2 - Z_AXIS [Dimension 2 Enumeration] 0 - NORMAL 1 - REBOOST
200	0	64	OAP_MIN_SPACE	DeltaTime	sec	0 <= OAP_MIN_SPACE < 50	(3)(2)	Minimum thruster firing spacing for 3 axes, uni-polar and bi-polar values. [Dimension 1 Enumeration] 0 - X_AXIS 1 - Y_AXIS 2 - Z_AXIS [Dimension 2 Enumeration] 0 - UNIPOLAR 1 - BIPOLAR

3.2.3.4.2 Stored Command Sequence Parameter Block (OBJ_SCS)

The stored command sequence parameter block contains SCL command sequences.

Name: OBJ_SCS

ID: 0xA

Task: CMD_PROC_TASK

Constraints: No checks done other than parameter constraint validation.

Slots: 2

Packet Length: 16399

Interface Definition 3-41 OBJ_SCS

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Units	Constraints	Dimensions	Description
0	0	8	OBJ_ID	UInt8		10		Object ID.
1	0	24	OBJ_SPARE	UInt8		0	(3)	Spare field - must be zero.
4	0	16	OBJ_VERSION	UInt16		None		User defined version number.
6	0	16	OBJ_CHECKSUM	UInt16		None		Sum to zero checksum. When all words (16 bits) of the object (including the checksum) are added (carry ignored) the result will be zero.
8	0	32	OBJ_SCS_CNT	UInt32	None	2 <= OBJ_SCS_CNT <= 700		Number of scripts to follow.
12	0	8	OBJ_SCS	UInt8	none	None	(16384)	Raw script data.

3.2.3.4.3 Timekeeping Parameter Block (OBJ_TIMEKEEPING)

The timekeeping parameter block contains parameters used for time calculations, including hardware oscillator frequencies.

Name: OBJ_TIMEKEEPING

ID: 0xB

Task: TIME_MGR

Constraints: No checks done other than parameter constraint validation.

Slots: 2

Packet Length: 63

Interface Definition 3-42 OBJ_TIMEKEEPING

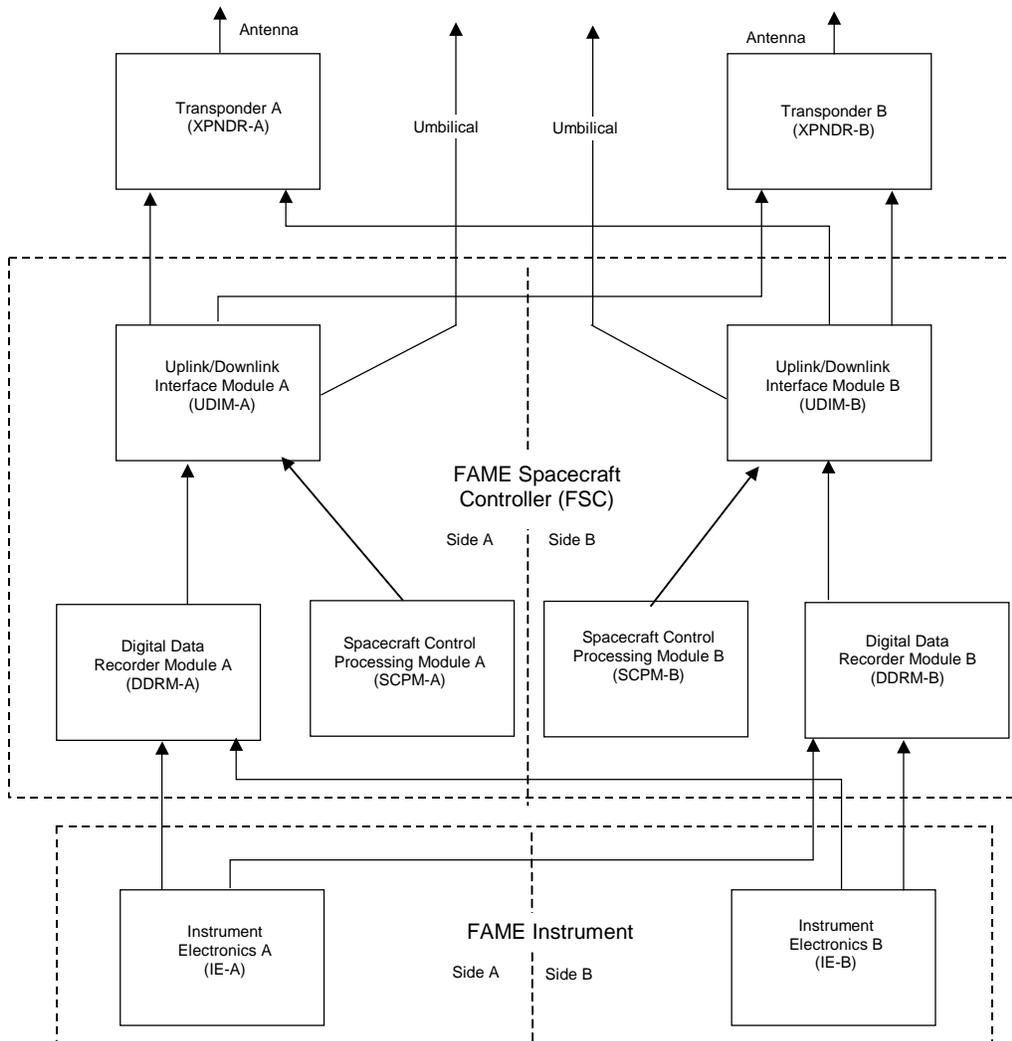
Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Units	Constraints	Dimensions	Description
0	0	8	OBJ_ID	UInt8		11		Object ID.
1	0	24	OBJ_SPARE	UInt8		0	(3)	Spare field - must be zero.
4	0	16	OBJ_VERSION	UInt16		None		User defined version number.
6	0	16	OBJ_CHECKSUM	UInt16		None		Sum to zero checksum. When all words (16 bits) of the object (including the checksum) are added (carry ignored) the result will be zero.
8	0	64	OT_MAX_ADJUST	DeltaTime	sec	$0 < OT_MAX_ADJUST \leq 300$		Largest time adjustment allowed.
16	0	64	OT_MIN_SET_TIME	Time	sec	567648000		Minimum allowable argument for SET_TIME command.
24	0	64	OT_MAX_SET_TIME	Time	sec	948672000		Maximum allowable argument for SET_TIME command.
32	0	64	OT_J2000_OFFSET	Time	sec	$630763180 < OT_J2000_OFFSET \leq 630763186$		Number of seconds between spacecraft epoch and J2000 epoch.
40	0	64	OT_SCS_OFFSET	Time	sec	567648000		Number of seconds between spacecraft epoch and SCS epoch.
48	0	64	OT_UTC_OFFSET	Time		$0 \leq OT_UTC_OFFSET \leq 20$		Time offset for UTC sent over ISSBUS
56	0	32	OT_TIMER_FREQ	UInt32	1/sec	$19800000 \leq OT_TIMER_FREQ \leq 20200000$		Frequency of on-board timer.

3.3 Return Link

The return link interface supports ground collection of FAME telemetry including both science data and housekeeping data. The return link is based on the CCSDS Telemetry Channel Coding (Convolutional and Reed-Solomon) and Advanced Orbiting Systems (AOS) Recommendations that specify a layered approach for telemetry protocols and formats. Refer to the CCSDS documents listed in Section 2.2 for detailed information about the telemetry related Recommendations.

The unencrypted return link is handled on-board the spacecraft by the FAME Spacecraft Controller (FSC) that has two internally redundant sides designated as the A-side and B-side and two redundant transponders. The return link data flow is depicted in Figure 3-7. A selected transponder is configured to accept a clock-and-data digital signal from the Uplink/Downlink Interface Module (UDIM) of the active FSC side and that transponder converts this signal to the return link radio frequency (RF) signal that is transmitted via the antennae. The supported data rates are 1000 bps, 8000 bps, 100,000 bps, 250,000 bps, 500,000 bps and 1,000,000 bps. The UDIM of the active FSC side multiplexes return link data from its corresponding Spacecraft Control Processing Module (SCPM) and the active side of the FAME Instrument Electronics (IE) via the Digital Data Recorder Module (DDRM). When no return link data is available, the UDIM inserts "idle" data. The UDIMs of both FSC sides are always powered and send a clock-and-data digital signal to both transponders and the umbilical. However, the UDIM of the non-active FSC side is always sending "idle" data because its corresponding SCPM and DDRM are not powered.

Figure 3-7 Return Link Data Flow



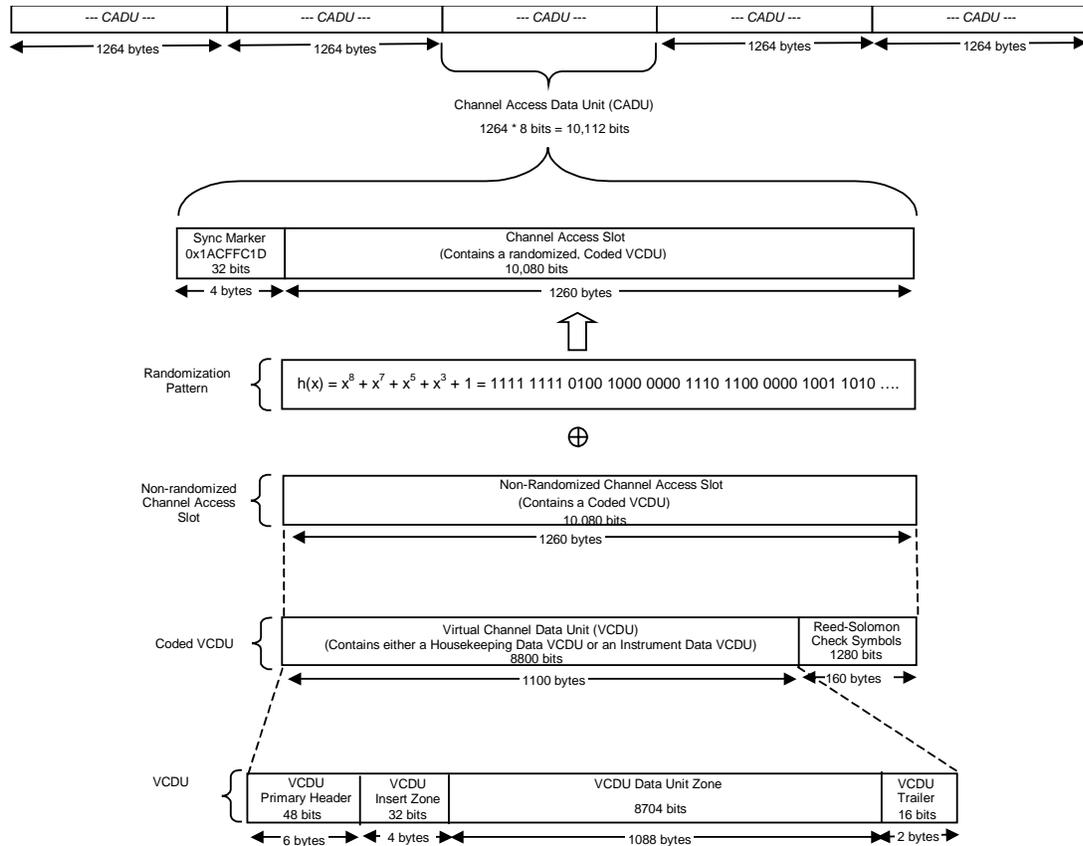
The CCSDS layering concept for telemetry as applied to FAME is depicted in Figure 3-8, *Return Link Digital Protocol*; Figure 3-9, *Coded VCDU Digital Protocol*; and Figure 3-10, *Housekeeping VCDU Data*. The lowest layer provides for the transmission of telemetry data using the radio frequency path (i.e. physical channel) connecting the FAME spacecraft to the receiving ground station. The other layers provide encoding for reliable transmission, data routing, and mission specific content.

An active return link contains a constantly modulated signal over the physical channel. The single data structure sent over the physical channel is the Channel Access Data Unit (CADU) that contains a synchronization pattern and the encoded telemetry data. The CADU is discussed further in Subsection 3.3.1.

The encoding layer provides both Reed-Solomon and convolutional coding as described in the CCSDS Recommendation for Telemetry Channel Coding (CCSDS 101.0.B-4). To ensure a sufficient bit transition density to maintain bit-synchronization of the received telemetry signal, the telemetry data is pseudo-randomized (after Reed-Solomon encoding, but before convolutional encoding) using the randomization procedure described in CCSDS 101.0-B-4, Section 6, Pseudo Randomizer. The randomization is accomplished by exclusive ORing the telemetry data (but not the synchronization pattern) with the pseudo-random sequence generated using the polynomial $h(x) = x^8 + x^7 + x^5 + x^3 + 1$.

Both the data routing layer and mission specific content layer for the return link are detailed in the CCSDS Recommendation for Advanced Orbiting Systems [AOS] (CCSDS 701.0-B-2). FAME utilizes what CCSDS terms a hybrid configuration where CCSDS AOS is used for the return link and CCSDS Conventional Telecommanding is used for the forward link.

Figure 3-8 Return Link Digital Protocol



3.3.1 Channel Access Data Unit (CADU)

The top portion of Figure 3-8 depicts the standard data structure known as the Channel Access Data Unit (CADU), which is sent over the return link physical channel. The CADU is the fixed-length 1264-byte transport frame for the return link and is described in Interface Definition 3-43. The transport frame provides for the flow of multiple virtual channels over the single physical channel of the return link. The fixed-length transport frame contains a 4-byte synchronization pattern followed by a randomized, coded virtual channel data unit (VCDU) containing either housekeeping data or instrument data. If neither housekeeping data nor instrument data VCDUs are ready for downlink, an idle VCDU containing fill data is sent. The virtual channel id field that is common to the housekeeping, instrument, and idle VCDUs identifies the type of data in each frame.

Interface Definition 3-43 Channel Access Data Unit

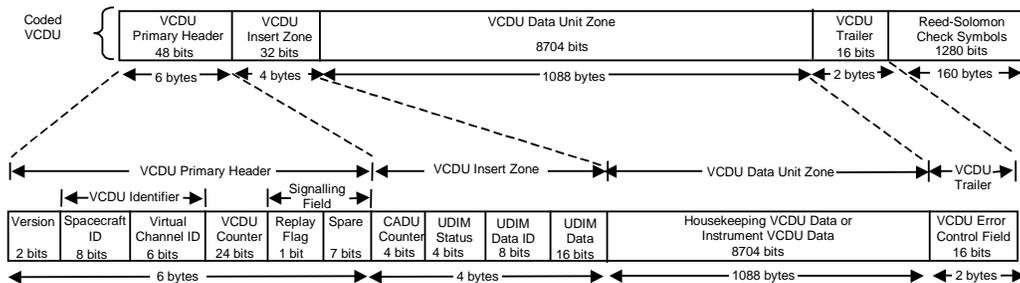
Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	32	SYNC_MARKER	Bytes	0x1ACFFC1D	Synchronization Pattern.
4	0	1260*8	CHANNEL_ACCESS_SLOT	Bytes	None	Contains a randomized, Coded Virtual Channel Data Unit (VCDU)

3.3.2 Coded Virtual Channel Data Unit (VCDU)

The Coded Virtual Channel Data Unit (VCDU) depicted in Figure 3-9 is used to downlink both Housekeeping VCDU Data and Instrument VCDU Data. The Coded VCDU is described in Interface Definition 3-44.

The Coded VCDU contains a field for Reed-Solomon Check Symbols that is populated by the UDIM after a housekeeping or instrument non-coded VCDU is received from its source. To protect against errors during the transfer of the non-coded VCDU to the UDIM, the source calculates a cyclic redundancy code (CRC) and stores it in the VCDU Error Control Field in the VCDU trailer. When validating this CRC in ground software, the Insert Zone fields, which are also populated by the UDIM, must be set to all zeros to recreate the state of the fields when the CRC was calculated at the source.

Figure 3-9 Coded VCDU Digital Protocol



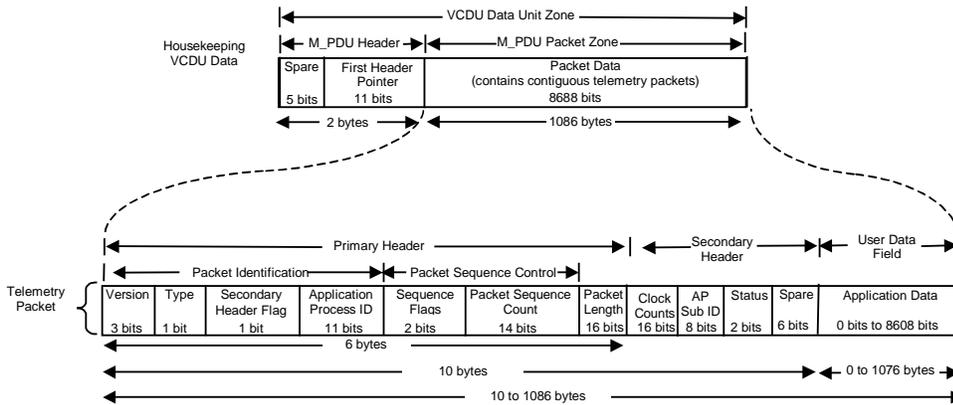
Interface Definition 3-44 Coded Virtual Channel Data Unit

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	2	VERSION_NUMBER	Constant	1	Identifies the CCSDS Virtual Channel Data Unit.
0	2	8	SPACECRAFT_ID	Constant	0x8A	Identifies the FAME Observatory.
1	2	6	VIRTUAL_CHANNEL_ID	Byte	See Table 3-1 Virtual Channel ID Assignments	Identifies the virtual channel.
2	0	24	VCDU_COUNTER	Longword	None	Sequential count (modulo 16,777,216) of the total number of VDCUs for the virtual channel.
5	0	1	REPLAY_FLAG	Bit	0 = Realtime 1 = Replay	Used to discriminate between realtime and replay VCDUs transmitted on a physical channel when they both use the same VCID. Not used for FAME.
5	1	7	SPARE_1	Constant	0	Spare bits.
6	0	4	CADU_COUNTER	Byte	None	Sequential count (modulo 16) of the total number of CADUs for the physical channel. This is an INSERT_ZONE field.
6	4	4	STATUS	Bits	[TDB]	Status bits inserted by the UDIM. [TDB] This is an INSERT_ZONE field.
7	0	8	DATA_ID	Byte	[TDB]	Identifies DATA field inserted by the UDIM. [TDB] This is an INSERT_ZONE field.
8	4	16	DATA	Word	[TDB]	Data field inserted by the UDIM and identified by the DATA_ID field. If the DATA_ID indicates this is the instrument timing pulse information field, then the field will specify the bit location in a CADU corresponding to the instrument timing pulse. This is an INSERT_ZONE field.
10	0	8704	VCDU_DATA	Bytes	See VCDU Data Definitions	Housekeeping or Instrument VCDU Data.
1098	0	16	VCDU_ERROR_CONTROL_FIELD	Word	None.	Cyclic Redundancy Code to detect errors in the previous fields using the polynomial $g(x) = x^{16} + x^{12} + x^5 + 1$. The INSERT_ZONE fields must be set to all zeroes when validating the CRC on the ground because the CRC is calculated before the FSC populates the INSERT_ZONE fields.
1100	0	1280	RS_CHECK_SYMBOLS	Bytes	Reed-Solomon (255,223)	Protects the previous fields using a Reed-Solomon (255,223) code.

3.3.2.1 Housekeeping Virtual Channel Data Unit (VCDU)

The Housekeeping VCDUs provide the CCSDS Space Link Subnetwork (SLS) multiplexing service as described in CCSDS 701.0-B-2 (AOS). These VCDUs contain housekeeping data from the bus and the instrument in the VCDU Data Unit Zone. The format of the Housekeeping VCDU Data is depicted in Figure 3-10 and described in Interface Definition 3-45. Variable-sized telemetry packets (based on Version-1 CCSDS packets) are multiplexed and packed contiguously into the packet data field per the CCSDS AOS recommendations. The format of these telemetry packets is shown in Figure 3-10 and described in Interface Definition 3-46.

Figure 3-10 Housekeeping VCDU Data



Interface Definition 3-45 Housekeeping VCDU Data

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	5	SPARE_2	Constant	0	Spare bits.
0	5	11	FIRST_HDR_PTR	Word	0-1085 2046 – Idle data 2047 – No packet header	Byte offset into the PACKET_DATA field to identify the starting location of the first packet header.
2	0	8704	PACKET_DATA	Bytes	None.	Telemetry Packets inserted contiguously.

Interface Definition 3-46 Telemetry Packet

Byte Offset	Bit Offset	# of Bits	Field Name	Data Type	Constraints	Description
0	0	3	VERSION_NUMBER	Constant	0	Identifies the Version-1 CCSDS Packet.
0	3	1	TYPE	Constant	0	Indicates a telemetry packet.
0	4	1	SECONDARY_HDR_FLAG	Constant	1	Indicates the secondary header is used. The secondary header contains the CLOCK_COUNTS, AP_SUBID, STATUS and SPARE fields.
0	5	11	APID	Word	0 to 63 - Reserved 64 to 959 - Bus telemetry 960 to 1855 - Instr telemetry 1856 to 2031 - Reserved by FAME 2032 to 2046 - Reserved by CCSDS 2047- fill packet	Application process identifier. Identifies the format and contents of the APPLICATION_DATA field.
2	0	2	SEQUENCE_FLAGS	Bits	0 = Middle 1 = First 2 = Last 3 = Standalone	Indicates whether this packet is a complete structure or a component of a higher layer data structure. All packets for FAME are identified as Standalone.
2	2	14	PACKET_SEQUENCE_COUNT	Word	None.	Sequential counter (modulo 16384) of packets for the application id (APID). Set to all zeros for a fill packet. The counter is reset to 1 for the first packet of each memory dump sequence.
4	0	16	PACKET_LENGTH	Word	1 to 1079	Length in bytes of the fields to follow minus 1.
6	0	16	CLOCK_COUNTS	Word	0-59,999	FAME specific clock ticks at packet assembly. The instrument will use its clock for its SOH packets. The satellite controller will use its clock for its SOH packets. Resolution of 1 msec. Will reset to zero every 60 seconds. Set to all zeros for a fill packet.
8	0	8	AP_SUBID	Word	0 to 63	Application process sub-identifier. Identifies various instances of the formatted application data.
9	0	2	STATUS	Word	0 = Fresh 1 = Duplicate 2 = Stale 3 = Invalid	Status of the application data field. Fresh indicates initial data or a data update. Duplicate indicates the data has not changed. Stale indicates the data was expected to be updated, but was not. Invalid indicates no initial data was provided.
9	2	6	SPARE	Byte	0	Spare bits.
10	0	0 to 8624 (mod 8)	APPLICATION_DATA	Bytes	Refer to detailed telemetry packet definitions.	Application specific data. Set to all zeros for a fill packet.

3.3.2.1.1 Housekeeping Telemetry Packets

The Housekeeping Telemetry Packets are listed in the following table. These packets include FSW Bus Diagnostics, FSW Bus State Of Health Packets, FSW Bus Event Packets, and Spacecraft HW Packets.

Table 3-8 Housekeeping Telemetry Packets

AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
0x90	FSW Bus State Of Health	STATUS_SUMMARY	Raw Status Summary Bits Packet	0 - SUB_RES	15	True	True
0xA4	FSW Bus State Of Health	UPLINK_STATUS	Uplink Status Packet	0 - SUB_RES	23	True	True
0xCA	FSW Bus State Of Health	ISR_API_SOH	Interrupt Service Routine API State Of Health Packet	0 - SUB_RES	5	True	True
0xCD	FSW Bus State Of Health	LOG_SOH	Log State Of Health Packet	0 - SUB_RES	15	True	True
0xD0	FSW Bus State Of Health	MEM_API_SOH	Memory API State Of Health Packet	0 - SUB_RES	5	True	True
0xD2	FSW Bus State Of Health	MEM_DUMP_API_SOH	Memory Dump API State Of Health Packet	0 - SUB_RES	23	True	True
0xD5	FSW Bus State Of Health	OBJ_API_SOH	Object API State Of Health Packet	0 - SUB_RES	5	True	True
0xD6	FSW Bus State Of Health	CMD_PROC_TASK_SOH	Command Processing Task State Of Health Packet	0 - SUB_RES	17	True	True
0xDB	FSW Bus State Of Health	CMD_UPLINK_TASK_SOH	Command Uplink Task State Of Health Packet	0 - SUB_RES	11	True	True
0xE3	FSW Bus State Of Health	RLT_API_SOH	Return Link Table API State Of Health Packet	0 - SUB_RES	5	True	True
0x104	FSW Bus State Of Health	TASK_MGR_SOH	Task Manager State Of Health Packet	0 - SUB_RES	5	True	True
0x109	FSW Bus State Of Health	TIMER_API_SOH	Timer API State of Health Packet	0 - SUB_RES	5	True	True
0x10B	FSW Bus State Of Health	TLM_PROC_TASK_SOH	Telemetry Processing Task State Of Health Packet	0 - SUB_RES	15	True	True
0x10E	FSW Bus State Of Health	VERSION_SOH	Version State of Health Packet	0 - SUB_RES	5	True	True
0x110	FSW Bus State Of Health	WDOG_API_SOH	Watchdog API State of Health Packet	0 - SUB_RES	9	True	True
0x111	FSW Bus State Of Health	BTT_SOH	Boot Telemetry Table State of Health Packet	0 - SUB_RES	19	True	False
0x113	FSW Bus State Of Health	BKGRND_DIAGS_TASK_SOH	Background Diagnostic Task State of Health Packet	0 - SUB_RES	19	True	True
0x117	FSW Bus State Of Health	ADAC_TASK_SOH	Attitude Determination And Control Task State of Health Packet	0 - SUB_RES	95	False	True
0x126	FSW Bus State Of Health	EVT_LOG_API_SOH	Event Log API State Of	0 - SUB_RES	11	True	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
			Health Packet				
0x128	FSW Bus State Of Health	RL_SOH	Return Link State of Health Packet	0 - SUB_RES	5	True	True
0x12A	FSW Bus Diagnostics	RIU_DIAGNOSTIC_DATA	RIU Diagnostic Raw Data Packet	0 - RIU_DD_SUB_RIU_1 1 - RIU_DD_SUB_RIU_2	33	False	True
0x12B	FSW Bus State Of Health	RIU_HOUSEKEEPING_DATA	RIU Housekeeping Raw Data	0 - SUB_RES	33	False	True
0x200	Spacecraft IO	PKT_1	PACKET 1	0 - SUB_RES	97	True	True
0x20B	Spacecraft IO	PKT_2	PACKET 2	0 - SUB_RES	198	True	True
0x258	FSW Bus Events	BOOT_DIAG_FAILURE	Boot Diagnostic Failure	0 - SUB_RES	13	True	True
0x259	FSW Bus Events	BOOT_UP	Boot Code Up	0 - SUB_RES	13	True	True
0x25B	FSW Bus Events	CMD_BAD_CONSTRAINT	Command Failed Constraint Check	0 - SUB_RES	13	True	True
0x25C	FSW Bus Events	CMD_BAD_DISPOSITION	Bad Command Disposition	0 - SUB_RES	13	False	True
0x25D	FSW Bus Events	CMD_BAD_FORMAT	Bad Command Format	0 - SUB_RES	13	True	True
0x25E	FSW Bus Events	CMD_BAD_PARAMETER	Bad Command Parameter	0 - SUB_RES	13	True	True
0x260	FSW Bus Events	CMD_LOG_FULL	Command Log Full	0 - SUB_RES	13	False	True
0x261	FSW Bus Events	CMD_TIMEOUT	Command Timeout	0 - SUB_RES	13	False	True
0x262	FSW Bus Events	DIAG_LOG_FULL	Diagnostics Log Full	0 - SUB_RES	13	False	True
0x263	FSW Bus Events	EF_ERRNO_INDICATION	Event Flag Error Indication	0 - SUB_RES	13	False	True
0x264	FSW Bus Events	EF_INVALID_DATA	Event Flag Invalid Data	0 - SUB_RES	13	False	True
0x265	FSW Bus Events	EV_LOG_FULL	Event Log Full	0 - SUB_RES	13	False	True
0x266	FSW Bus Events	FLT_SOFTWARE_ERROR	Internal Flight Software Error	0 - SUB_RES	13	True	True
0x267	FSW Bus Events	ISR_PANIC	ISR Panic	0 - SUB_RES	13	False	True
0x268	FSW Bus Events	ISR_SPURIOUS	Spurious ISR	0 - SUB_RES	13	False	True
0x269	FSW Bus Events	LOG_COMPRESSION_COMPLETE	Log Compression Complete	0 - SUB_RES	13	False	True
0x26A	FSW Bus Events	LOG_COMPRESSION_ERROR	Log Compression Error	0 - SUB_RES	13	False	True
0x26B	FSW Bus Events	LOG_EMPTY	Log Empty	0 - SUB_RES	13	False	True
0x26D	FSW Bus Events	MEM_LOAD_DONE	Memory Load Done	0 - SUB_RES	13	True	True
0x26E	FSW Bus Events	MEM_UNEXPECTED_BLOCK_LOAD_ENABLE	Unexpected Memory Block Load Enable	0 - SUB_RES	13	True	True
0x26F	FSW Bus Events	OBJ_BAD	Bad Object Found	0 - SUB_RES	13	False	True
0x270	FSW Bus Events	OBJ_ILLEGAL_STATE	Illegal object state transition	0 - SUB_RES	13	False	True
0x271	FSW Bus Events	OBJ_LOAD_FAILED	Object Load Failed	0 - SUB_RES	13	False	True
0x272	FSW Bus Events	OBJ_LOAD_VALIDATED	Object Load Validated	0 - SUB_RES	13	False	True
0x273	FSW Bus Events	OBJ_SANITY_FAILURE	Object Sanity Check Failure	0 - SUB_RES	13	False	True
0x274	FSW Bus Events	OBJ_SELECT_FAILED	Object Selected Failed	0 - SUB_RES	13	False	True
0x275	FSW Bus Events	OBJ_SELECTED	Object Selected	0 - SUB_RES	13	False	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
0x276	FSW Bus Events	REBOOT_COMMANDED	Commanded Reboot	0 - SUB_RES	13	False	True
0x277	FSW Bus Events	RLT_NO_DATA	No RLT Data	0 - SUB_RES	13	False	True
0x278	FSW Bus Events	RLT_STALE_DATA	Stale Data	0 - SUB_RES	13	False	True
0x279	FSW Bus Events	SAM_ERRNO_INDICATION	SAM Error Number Indication	0 - SUB_RES	13	False	True
0x284	FSW Bus Events	SAM_INVALID_DATA	SAM Invalid Data	0 - SUB_RES	13	False	True
0x285	FSW Bus Events	SCL_LOG_FULL	SCL Log Full	0 - SUB_RES	13	False	True
0x286	FSW Bus Events	SCS_APP_ALERT	SCS Application Alert	0 - SUB_RES	13	False	True
0x287	FSW Bus Events	SCS_APP_WARNING	SCS Application Warning	0 - SUB_RES	13	False	True
0x288	FSW Bus Events	SCS_ERROR	SCS Error	0 - SUB_RES	13	False	True
0x289	FSW Bus Events	SSPM_BUS_ERROR	Bus Error	0 - SUB_RES	13	False	True
0x28A	FSW Bus Events	SSPM_EDAC_ERROR	EDAC Error	0 - SUB_RES	13	False	True
0x28B	FSW Bus Events	STARTUP_CAT_UP	Spacecraft Command and Telemetry Up	0 - SUB_RES	13	False	True
0x28C	FSW Bus Events	STARTUP_GNC_UP	Spacecraft GNC Up	0 - SUB_RES	13	False	True
0x28D	FSW Bus Events	STARTUP_OS_UP	Operating System Up	0 - SUB_RES	13	False	True
0x28E	FSW Bus Events	STARTUP_SRM_UP	Spacecraft Resource Management Up	0 - SUB_RES	13	False	True
0x28F	FSW Bus Events	STDOUT_LOG_FULL	STDOU Log Full	0 - SUB_RES	13	False	True
0x290	FSW Bus Events	TASK_CTL	Task Control Event	0 - SUB_RES	13	False	True
0x291	FSW Bus Events	TASK_DELETED	Task Deleted	0 - SUB_RES	13	False	True
0x292	FSW Bus Events	TASK_EXCEPTION	Task Exception	0 - SUB_RES	13	False	True
0x293	FSW Bus Events	TASK_RESET	Task Reset	0 - SUB_RES	13	False	True
0x294	FSW Bus Events	TASK_SHUTDOWN	Task Shutdown	0 - SUB_RES	13	False	True
0x295	FSW Bus Events	TASK_STARTUP	Task Startup	0 - SUB_RES	13	True	True
0x296	FSW Bus Events	TLM_LOG_FULL	Telemetry Log Full	0 - SUB_RES	13	False	True
0x297	FSW Bus Events	TLM_OUT_OF_LIMITS_RED	Telemetry Out Of Limits Red	0 - SUB_RES	13	False	True
0x298	FSW Bus Events	TLM_OUT_OF_LIMITS_YELLOW	Telemetry Out Of Limits Yellow	0 - SUB_RES	13	False	True
0x299	FSW Bus Events	BKGRND_DIAG_FAILURE	Background Diagnostic Failure	0 - SUB_RES	13	False	True
0x29B	FSW Bus Events	MEM_ABORT	Memory Abort	0 - SUB_RES	13	True	True
0x2A5	FSW Bus Events	CMD_AUTH_FAILURE	Auth Count Failure	0 - SUB_RES	13	True	True
0x2A9	FSW Bus Events	ADAC_ATTITUDE_VALID	Attitude Quality Change	0 - SUB_RES	13	False	True
0x2AA	FSW Bus Events	ADAC_IMU_TRANSITION	ADAC IMU Transition	0 - SUB_RES	13	False	True
0x2AB	FSW Bus Events	ADAC_IMU_UNREAS	IMU Data Unreasonable	0 - SUB_RES	13	False	True
0x2AC	FSW Bus Events	ADAC_RATE_VALID	ADAC Rate Valid	0 - SUB_RES	13	False	True
0x2AD	FSW Bus Events	ADAC_ST_IMAGE_ACCEPTED	Star Tracker Image Accepted	0 - SUB_RES	13	False	True
0x2AE	FSW Bus Events	ADAC_ST_IMAGE_REJECTED	Star Tracker Image	0 - SUB_RES	13	False	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
			Rejected				
0x2AF	FSW Bus Events	ADAC_STAR_TRK_REJECT	Star Tracker Solution Rejected	0 - SUB_RES	13	False	True
0x2BD	FSW Bus Diagnostics	ISR_API_DIAG	Interrupt Service Routine API Diagnostic Packet	0 - SUB_RES	35	True	True
0x2BF	FSW Bus Diagnostics	ISR_COUNT_DIAG	Interrupt Service Routine Count Diagnostic Packet	0 - CURRENT_PAGE_1 1 - CURRENT_PAGE_2 2 - CURRENT_PAGE_3 3 - CURRENT_PAGE_4 4 - LATCH_PAGE_1 5 - LATCH_PAGE_2 6 - LATCH_PAGE_3 7 - LATCH_PAGE_4	139	True	True
0x2C0	FSW Bus Diagnostics	LOG_DIAG	Log Diagnostics Packet	1 - TLM 2 - EVT 3 - CMD 4 - SCS 5 - STDOUT 6 - DIAGLOG	51	True	True
0x2C3	FSW Bus Diagnostics	MEM_API_DIAG	Memory API Diagnostic Packet	0 - SUB_RES	35	True	True
0x2C5	FSW Bus Diagnostics	MEM_DUMP_API_DIAG	Memory Dump API Diagnostic Packet	0 - SUB_RES	131	True	True
0x2C6	FSW Bus Diagnostics	CLOCK_API_DIAG	Clock API Diagnostic Packet	0 - SUB_RES	59	True	True
0x2C7	FSW Bus Diagnostics	TASK_MGR_COMMON_DIAG	Task Manager Common Diagnostic Packet	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19	83	True	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
				20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30			
0x2C8	FSW Bus Diagnostics	CMD_PROC_TASK_DIAG	Command Processing Task Diagnostic Packet	0 - SUB_RES	47	True	True
0x2C9	FSW Bus Diagnostics	CMD_PROC_TASK_EN_FLG_DIAG	Command Processing Task Enable Flag Diagnostic Packet	0 - CMD_PROC_TSK_EN_F LAG_DIAG_SUB_RES	91	True	True
0x2CB	FSW Bus Diagnostics	CMD_PROC_TASK_THREAD_DIAG	Command Processing Task Thread Diagnostic Packet	0 - SUB_RES	135	True	True
0x2CD	FSW Bus Diagnostics	CMD_UPLINK_LAST_COMMAND	Command Uplink Last Command Packet	1 - FWL 2 - SCS 3 - INTRA 4 - INTER 5 - FWL_SAM 6 - SCS_SAM	1047	True	True
0x2CE	FSW Bus Diagnostics	CMD_UPLINK_TASK_DIAG	Command Uplink Task Diagnostic Packet	0 - SUB_RES	79	True	True
0x2D0	FSW Bus Diagnostics	MTX_API_DIAG	Mutex API Diagnostic Packet	1 - SUB_HITS 2 - SUB_LOCK 3 - SUB_UNLOCK	103	True	True
0x2D1	FSW Bus Diagnostics	OBJ_API_DIAG	Object API Diagnostic Packet	0 - SUB_ONE 1 - SUB_TWO 2 - SUB_THREE 3 - SUB_FOUR 4 - SUB_FIVE 5 - SUB_SIX 6 - SUB_SEVEN 7 - SUB_EIGHT 8 - SUB_NINE 9 - SUB_TEN 10 - SUB_ELEVEN 11 - SUB_TWELVE 12 - SUB_THIRTEEN 13 - SUB_FOURTEEN	111	True	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
				14 - SUB_FIFTEEN 15 - SUB_SIXTEEN 16 - SUB_SEVENTEEN 17 - SUB_EIGHTEEN 18 - SUB_NINETEEN 19 - SUB_TWENTY			
0x2D4	FSW Bus Diagnostics	OBJ_DIR_DIAG	Object API Directory Diagnostic Packet	0 - SUB_RES	63	True	True
0x2D6	FSW Bus Diagnostics	RLT_API_DIAG	Return Link Table API Diagnostic Packet	0 - SUB_RES	31	True	True
0x2D8	FSW Bus Diagnostics	RLT_DATA_STATE_DIAG	Return Link Table Data State Diagnostic Packet	1 - ISC_A 2 - ISC_B 3 - ISC_C 4 - ISC_D	123	True	True
0x2D9	FSW Bus Diagnostics	SAM_CHAR_API_DIAG	SAM Characteristics API Diagnostic Packet	0 - SUB_RES	41	True	True
0x2DC	FSW Bus Diagnostics	SSPM_REG_DIAG	SSPM Register Diagnostic Packet	0 - SUB_RES	19	True	True
0x2F2	FSW Bus Diagnostics	TASK_MGR_DIAG	Task Manager Diagnostic Packet	0 - SUB_RES	11	True	True
0x2F3	FSW Bus Diagnostics	TASK_MGR_EXC_INFO_DIAG	Task Manager Exception Diagnostic Packet	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23	67	True	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
				24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30			
0x2F4	FSW Bus Diagnostics	TASK_MGR_FPR_DIAG	Task Floating Point Register Diagnostic Packet	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30	139	True	True
0x2F5	FSW Bus Diagnostics	TASK_MGR_GR1_DIAG	Task General Register Set 1 Diagnostic Packet	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7	71	True	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
				8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30			
0x2F6	FSW Bus Diagnostics	TASK_MGR_GR2_DIAG	Task General Register Set 2 Diagnostic Packet	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21	71	True	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
				22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30			
0x2F7	FSW Bus Diagnostics	TASK_SUMMARY_DIAG	Task Summary Diagnostic Packet	0 - SUB_RES	93	True	True
0x2FA	FSW Bus Diagnostics	TIME_MGR_DIAG	Time Manager Diagnostic Packet	0 - SUB_RES	27	True	True
0x2FB	FSW Bus Diagnostics	TIMER_API_ABS_DIAG	Timer API Absolute Diagnostic Packet	0 - SUB_RES	139	True	True
0x2FC	FSW Bus Diagnostics	TIMER_API_REL_DIAG	Timer API Relative Diagnostic Packet	1 - PAGE_1 2 - PAGE_2 3 - PAGE_3 4 - PAGE_4 5 - PAGE_5	131	True	True
0x2FE	FSW Bus Diagnostics	TLM_PROC_TASK_DIAG	Telemetry Processing Task Diagnostic Packet	0 - SUB_RES	55	True	True
0x301	FSW Bus Diagnostics	VERSION_DIAG	Version Diagnostic Packet	1 - VERSION_DESCRIPTOR 2 - ARCH_DESCRIPTION 3 - CONFIG_DESCRIPTION	203	True	True
0x303	FSW Bus Diagnostics	WDOG_API_DIAG	Watchdog API Diagnostic Packet	0 - SUB_RES	83	True	True
0x305	FSW Bus Diagnostics	XDIAG_RESULTS_DIAG	Extended Diagnostics Results Diagnostic Packet	0 - SUB_RES	35	True	True
0x306	FSW Bus Diagnostics	BKGRND_DIAGS_TASK_DIAG	Background Diagnostic Task Diagnostic Packet	0 - SUB_RES	131	True	True
0x308	FSW Bus Diagnostics	BKGRND_DIAGS_TIMING_DIAG	Background Diagnostic Task Timing Diagnostic Packet	0 - SUB_RES	35	True	True
0x30B	FSW Bus Diagnostics	EVENT_API_DIAG	Event API Diagnostic Packet	1 - GLOBAL 2 - BLOCK_0 3 - BLOCK_1 4 - BLOCK_2 5 - BLOCK_3 6 - BLOCK_4	27	True	True

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AP ID	Category	Name	Description	Sub ID Constraints	Len	Boot	Operational
				7 - BLOCK_5 8 - BLOCK_6 9 - BLOCK_7 10 - BLOCK_8 11 - BLOCK_9 12 - BLOCK_10 13 - BLOCK_11 14 - BLOCK_12 15 - BLOCK_13 16 - BLOCK_14 17 - BLOCK_15 18 - BLOCK_16			
0x30C	FSW Bus Diagnostics	MEM_MGR_DIAG	Memory Manager Task Diagnostic Packet	0 - SUB_RES	64	True	True
0x319	FSW Bus Diagnostics	EVT_LOG_API_DIAG	Event Log API Diagnostic Packet	0 - SUB_RES	23	True	True
0x3E9	FSW Bus State Of Health	MEMORY_DUMP	Memory Dump Packet	0 - SUB_RES	1079	True	True

Notes:

AP_ID: The application identifier that defines the format of the telemetry packet.

Category: The telemetry packet category.

Spacecraft IO – Telemetry gathered via specialized spacecraft interfaces.

FSW Bus State Of Health – Telemetry indicating the state of FSC software processes.

FSW Bus Event – Telemetry indicating a spacecraft event.

FSW Bus Diagnostics – Telemetry used to troubleshoot FSC software processes.

Name: The telemetry packet name.

Sub ID Constraints: Range limitations for the telemetry packet sub identifier.

Description: Brief description of telemetry packet.

Length: The number of bytes in the application data field.

Boot: The telemetry packet can be downlinked during the boot monitor stage.

Operational: The telemetry packet can be downlinked during the operational mode of the flight software.

3.3.2.1.2 Detailed Housekeeping Telemetry Packet Definitions

This subsection defines each telemetry packet in detail. Each telemetry packet definition contains a description, the packet characteristics, and the format of the data items stored in the application data field of the telemetry packet.

The following characteristics will be identified for each telemetry packet:

- **Name:** The telemetry packet name.
- **Application ID:** The application identifier that defines the format of the telemetry packet.
- **Virtual Channel:** The virtual channel for the telemetry packet.
- **Timeout:** The maximum number of seconds that can elapse before the data is considered stale. The value 0 means the data never gets stale and is used primarily for spacecraft events.
- **Packet Length:** The value stored in the length field of the telemetry packet header. This is the number of bytes in the secondary header and the application data field minus 1.

The following additional characteristics will be identified for each telemetry packet that reports a spacecraft event.

- **Sticky Bit:** The associated status summary bit position.
- **SS Bit Name:** The field name for the status summary bit.
- **Cause:** The condition for which the event is sent.
- **Response:** The recommended action to take when the event occurs.
- **Severity:** The severity level – Informational (Green), Warning (Yellow), or Error (Red)

3.3.2.1.2.1 FSW Bus Diagnostics

3.3.2.1.2.1.1 Background Diagnostic Task Diagnostic Packet (BKGRND_DIAGS_TASK_DIAG)

The Background Diagnostic Task Diagnostic Packet

Name:	<i>BKGRND_DIAGS_TASK_DIAG</i>
Application ID:	<i>774</i>
Virtual Channel:	<i>9</i>
Boot:	<i>True</i>
Operational:	<i>True</i>
Timeout (seconds):	<i>30</i>
Packet Length:	<i>131</i>

Interface Definition 3-47 BKGRND_DIAGS_TASK_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	774	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	131	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	(16)	BDTD_ITER	UInt32	None	Iteration array.
74	0	32	(16)	BDTD_FAILURES	UInt32	None	Diagnostic failure array.

3.3.2.1.2.1.2 Background Diagnostic Task Timing Diagnostic Packet (BKGRND_DIAGS_TIMING_DIAG)

The Background Diagnostic Task Timing Diagnostic Packet

Name: *BKGRND_DIAGS_TIMING_DIAG*
Application ID: *776*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *35*

Interface Definition 3-48 BKGRND_DIAGS_TIMING_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	776	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	35	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	BDTD_UPTIME_COUNT	UInt32	None	Total count of OS ticks since uptime.
14	0	32	None	BDTD_UPTIME_TASK_COUNT	UInt32	None	Total count of OS ticks recorded when background diagnostics task is running since uptime.
18	0	64	None	BDTD_UPTIME_RATIO	IEEE64	None	Ratio of BDTD_UPTIME_TASK_COUNT to BDTD_UPTIME_COUNT.
26	0	32	None	BDTD_WINDOW_COUNT	UInt32	None	Total count of OS ticks in the last 10 seconds. Resets to 0 after 10 seconds.
30	0	32	None	BDTD_WINDOW_TASK_COUNT	UInt32	None	Total count of OS ticks recorded when background

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							diagnostics task is running in the last 10 seconds. Resets to 0 after 10 seconds.
34	0	64	None	BDTD_WINDOW_RATIO	leee64	None	Ratio of BDTD_WINDOW_TASK_COUNT to BDTD_WINDOW_COUNT.

3.3.2.1.2.1.3 Clock API Diagnostic Packet (CLOCK_API_DIAG)

The Clock Application Programmers Interface Diagnostic Packet

Name: *CLOCK_API_DIAG*
Application ID: *710*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *59*

Interface Definition 3-49 CLOCK_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	710	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	59	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	64	None	CAD_EPOCH_BASE	Time	None	Epoch base
18	0	64	None	CAD_EPOCH_ADJUST	Time	None	Internal epoch adjust.
26	0	64	None	CAD_LOW_ACC_COUNTER	Time	None	Low accuracy count.
34	0	64	None	CAD_J2000_OFFSET	Time	None	J2000 epoch offset.
42	0	64	None	CAD_SCS_OFFSET	Time	None	SCS epoch offset.
50	0	64	None	CAD_HI_RES_ROLLOVER	leee64	None	High resolution clock rollover count
58	0	32	None	CAD_FREQ	UInt32	None	Frequency used for high-accuracy clock.
62	0	16	(2)	CAD_SPARE	UInt16	None	Reserved.

3.3.2.1.2.1.4 Command Processing Task Diagnostic Packet (CMD_PROC_TASK_DIAG)

The Command Processing Task Diagnostic Packet

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Name: *CMD_PROC_TASK_DIAG*
Application ID: *712*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *47*

Interface Definition 3-50 *CMD_PROC_TASK_DIAG*

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	712	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	47	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	CPTD_BYTES_MALLOC	UInt32	None	Total number of bytes malloced by RTE.
14	0	16	None	CPTD_TOT_BAD_DISPOS	UInt16	None	Total number of bad dispositions returned after issuing SCSs (CEXL) from scripts or rules. This excludes timed-out dispositions. This number is cumulative. After reaching 65535, it will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
16	0	16	None	CPTD_TOT_TIM_OUT_DIS	UInt16	None	Total number of timed-out dispositions returned after issuing SCSs (CEXLs) from scripts or rules. This number is cumulative. After reaching 65535, it will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
18	0	16	None	CPTD_TOT_GOOD_DIS	UInt16	None	Total number of good dispositions returned after issuing SCSs (CEXLs) from scripts or rules. This number is cumulative. After reaching 65535, it will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
20	0	16	None	CPTD_TOT_MALLOC_ERRS	UInt16	None	Total number of malloc errors. This number is cumulative. After reaching 65535, it will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
22	0	32	None	CPTD_TOT_TLM_RTCOS	UInt32	None	Total number of telemetry type RTCOs. This number is cumulative. After reaching 4294967295, it will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
26	0	16	None	CPTD_TOT_SCE_RTCOS	UInt16	None	Total number of spacecraft event RTCOs. This number is cumulative. After reaching 65535, it will roll-over to zero. Finally, this number is reset after issuing an RTE start

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							command.
28	0	16	None	CPTD_TOT_GND_CMDS	UInt16	None	Total number of ground commands sent to CmdProc. This number is cumulative. After reaching 65535, this number will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
30	0	16	None	CPTD_TOT_SCL_ERR_MSGS	UInt16	None	Total number of scl error text messages logged to SCL Log. This number is cumulative. After reaching 65535, it will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
32	0	16	None	CPTD_TOT_SCL_TEXT_MSGS	UInt16	None	Total number of SCL text messages logged to SCL Log. This number is cumulative. After reaching 65535, it will roll-over to zero. Finally, this number is reset after issuing an RTE start command.
34	0	16	None	CPTD_NUM_TLM_DECOM	UInt16	None	Active number of telemetry type decoms registered. As decoms are added, this number is incremented. As decoms are deleted, this number is decremented.
36	0	16	None	CPTD_NUM_SCE_DECOM	UInt16	None	Active number of SCE type decoms registered. As decoms are added, this number is incremented. As decoms are deleted this number is decremented.
38	0	16	None	CPTD_NUM_DB_ITEMS	UInt16	None	Active number of database elements loaded to RTE. This number includes telemetry sensors, derived items, and decom numbers. It does not include forward chain links or backward chain links. As telemetry items are added or removed, this number is updated.
40	0	16	None	CPTD_TRACE_OPTIONS	UInt16	None	Current trace options settings. This is a bit-field used by the RTE.
42	0	32	None	CPTD_TOT_RTE_CYCLES	UInt32	None	Total RTE cycles. A cycle includes servicing scripting, rule processing, and servicing all queues. This number is cumulative. After 4294967295 is reached, the number rolls over to 0. Finally, this number is reset after issuing an RTE start command.
46	0	32	None	CPTD_TOT_APP_IDLE	UInt32	None	Total number Appldle() visits. This is a cumulative number. After 4294967295 is reached, the number rolls over to 0. Finally, this number is reset after issuing an RTE start command.
50	0	16	None	CPTD_NUM_FWD_LINKS	UInt16	None	Number of active forward links uploaded.
52	0	16	None	CPTD_NUM_BWD_LINKS	UInt16	None	Total number of backward links uploaded.

3.3.2.1.2.1.5 Command Processing Task Enable Flag Diagnostic Packet (CMD_PROC_TASK_EN_FLG_DIAG)

The Command Processing Task Enable Flag Diagnostic Packet provides enable/disable status bits for all possible SCS script (or rule) resource ids. SCS resource ids, (i.e. scs_resid), may range from 0 to 699.

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Name: *CMD_PROC_TASK_EN_FLG_DIAG*
Application ID: *713*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *91*

Interface Definition 3-51 CMD_PROC_TASK_EN_FLG_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	713	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	91	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - CMD_PROC_TSK_EN_FLAG_DIAG_SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	CPTEFD_SCRIPT_RULE_EN_0	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 0 to 31. 0 = enabled 1 = disabled MSBIT = RESID 0 LSBIT = RESID 31
14	0	32	None	CPTEFD_SCRIPT_RULE_EN_1	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 32 to 63. 0 = enabled 1 = disabled MSBIT = RESID 32 LSBIT = RESID 63
18	0	32	None	CPTEFD_SCRIPT_RULE_EN_2	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 64 to 95. 0 = enabled 1 = disabled MSBIT = RESID 64 LSBIT = RESID 95
22	0	32	None	CPTEFD_SCRIPT_RULE_EN_3	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 96 to 127. 0 = enabled 1 = disabled MSBIT = RESID 96 LSBIT = RESID 127
26	0	32	None	CPTEFD_SCRIPT_RULE_EN_4	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 128 to 159. 0 = enabled 1 = disabled MSBIT = RESID 128 LSBIT = RESID 159
30	0	32	None	CPTEFD_SCRIPT_RULE_EN_5	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 160 to 191. 0 = enabled 1 = disabled MSBIT = RESID 160 LSBIT = RESID 191

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
34	0	32	None	CPTEFD_SCRIPT_RULE_EN_6	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 192 to 223. 0 = enabled 1 = disabled MSBIT = RESID 192 LSBIT = RESID 223
38	0	32	None	CPTEFD_SCRIPT_RULE_EN_7	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 224 to 255. 0 = enabled 1 = disabled MSBIT = RESID 224 LSBIT = RESID 255
42	0	32	None	CPTEFD_SCRIPT_RULE_EN_8	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 256 to 287. 0 = enabled 1 = disabled MSBIT = RESID 256 LSBIT = RESID 287
46	0	32	None	CPTEFD_SCRIPT_RULE_EN_9	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 288 to 319. 0 = enabled 1 = disabled MSBIT = RESID 288 LSBIT = RESID 319
50	0	32	None	CPTEFD_SCRIPT_RULE_EN_10	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 320 to 351. 0 = enabled 1 = disabled MSBIT = RESID 320 LSBIT = RESID 351
54	0	32	None	CPTEFD_SCRIPT_RULE_EN_11	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 352 to 383. 0 = enabled 1 = disabled MSBIT = RESID 352 LSBIT = RESID 383
58	0	32	None	CPTEFD_SCRIPT_RULE_EN_12	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 384 to 415. 0 = enabled 1 = disabled MSBIT = RESID 384 LSBIT = RESID 415
62	0	32	None	CPTEFD_SCRIPT_RULE_EN_13	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 416 to 447. 0 = enabled 1 = disabled MSBIT = RESID 416 LSBIT = RESID 447
66	0	32	None	CPTEFD_SCRIPT_RULE_EN_14	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 448 to 479. 0 = enabled 1 = disabled MSBIT = RESID 448 LSBIT = RESID 479
70	0	32	None	CPTEFD_SCRIPT_RULE_EN_15	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 480 to 511. 0 = enabled 1 = disabled MSBIT = RESID 480 LSBIT = RESID 511
74	0	32	None	CPTEFD_SCRIPT_RULE_EN_16	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 512 to 543.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							0 = enabled 1 = disabled MSBIT = RESID 512 LSBIT = RESID 543
78	0	32	None	CPTEFD_SCRIPT_RULE_EN_17	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 544 to 575. 0 = enabled 1 = disabled MSBIT = RESID 544 LSBIT = RESID 575
82	0	32	None	CPTEFD_SCRIPT_RULE_EN_18	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 576 to 607. 0 = enabled 1 = disabled MSBIT = RESID 576 LSBIT = RESID 607
86	0	32	None	CPTEFD_SCRIPT_RULE_EN_19	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 608 to 639. 0 = enabled 1 = disabled MSBIT = RESID 608 LSBIT = RESID 639
90	0	32	None	CPTEFD_SCRIPT_RULE_EN_20	UInt32	0 - 0xFFFFFFFF	Enable flag bits for script/rule resids 640 to 671. 0 = enabled 1 = disabled MSBIT = RESID 640 LSBIT = RESID 671
94	0	32	None	CPTEFD_SCRIPT_RULE_EN_21	UInt32	0 - 0xFFFFFFFF0 (4 least significant bits are unused)	Enable flag bits for scripts/rule resids 672 to 699. 0 = enabled 1 = disabled MSBIT = RESID 672 LSBIT = unused (4 least significant bits are unused).

3.3.2.1.2.1.6 Command Processing Task Thread Diagnostic Packet (CMD_PROC_TASK_THREAD_DIAG)

The Command Processing Task Thread Diagnostic Packet

Name: *CMD_PROC_TASK_THREAD_DIAG*
Application ID: *715*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *135*

Interface Definition 3-52 CMD_PROC_TASK_THREAD_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	715	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	135	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier. 0) Reserved
10	0	32	(20)	CPTTD_SCH_EXEC_TIME	LoRes Time	0 - max time permitted to be scheduled.	Scheduled execution times of threads in seconds (GPS Epoch).
90	0	16	None	CPTTD_NUM_PEND_THREADS	UInt16	0 - Max Number of Pending Threads	Total number of pending threads on the scheduler. This includes threads with any of the possible states enumerated below under the constraints column of the field, ThreadState.
92	0	16	(20)	CPTTD_THREAD_RESID	UInt16	None	ResIDs of the most immediate pending script threads. (All threads are checked. The 20 threads with the minimum execution schedule times are reported here.).
132	0	8	(10)	CPTTD_THREAD_STATE	UInt8	0 - not running 1 - hibernating 2 - computable 3 - suspended 4 - eventwait 5 - exiting 6 - computing 15 - immediate	SCL state. Each byte represents the state of two scripts, one in each nibble.

3.3.2.1.2.1.7 Command Uplink Last Command Packet (CMD_UPLINK_LAST_COMMAND)

This diagnostic will contain the last command received by command uplink. There are 4 subids, for last command received from FWL, last command received from SCS, the last intra-isc command received and the last Inter-ISC command received

Name: *CMD_UPLINK_LAST_COMMAND*
Application ID: *717*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *1047*

Interface Definition 3-53 CMD_UPLINK_LAST_COMMAND

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	717	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	1047	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - FWL 2 - SCS 3 - INTRA 4 - INTER 5 - FWL_SAM 6 - SCS_SAM	Application packet sub-identifier. 1) Data for last FWL command 2) Data for last SCS command 3) Data for last Intra-ISC command 4) Data for last Inter-ISC command 5) SAM data for last FWL command 6) SAM data for last SCS command
10	0	8	(1044)	CULD_DATA	UInt8	None	Last command data.

3.3.2.1.2.1.8 Command Uplink Task Diagnostic Packet (CMD_UPLINK_TASK_DIAG)

The Command Uplink Task Diagnostic Packet

Name: *CMD_UPLINK_TASK_DIAG*
Application ID: *718*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *79*

Interface Definition 3-54 CMD_UPLINK_TASK_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	718	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	79	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	CUTD_FSW_CMD_CNT	UInt16	None	Number of FSW Commands received by the Uplink Task.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
12	0	16	None	CUTD_HEARTBEAT	UInt16	None	Counter for the Number of times the Uplink Task has woken up with at RETURN_TIMEOUT from EF_Wait() in the Main processing loop.
14	0	16	None	CUTD_FWL_CMD_CNT	UInt16	None	Number of messages received on the FWL_CMD_Q.
16	0	16	None	CUTD_INTRA_CMD_CNT	UInt16	None	Counter for the Number of Intra ISC commands received by the Uplink Task.
18	0	16	None	CUTD_SCS_CMD_CNT	UInt16	None	Counter for the Number of Stored Command Sequence commands received by the Uplink Task
20	0	16	None	CUTD_DISP_CNT	UInt16	None	Counter for the Number of Disposition messages received by the Uplink Task
22	0	16	None	CUTD_BLK_LOAD_CMD_CNT	UInt16	None	Counter for the Number of Block Load messages received by the Uplink Task
24	0	8	None	CUTD_SUCC_DISP_CNT	UInt8	None	Counter for the Number of Successful Disposition messages received by the Uplink Task
25	0	8	None	CUTD_FAIL_DISP_CNT	UInt8	None	Counter for the Number of Failure Disposition messages received by the Uplink Task
26	0	8	None	CUTD_DISP_EF_TOUT_CNT	UInt8	None	Counter for the Number of EF_Wait() Timeouts that occurred waiting for Disposition.
27	0	8	None	CUTD_DISP_TIMER_TOUT_CNT	UInt8	None	Counter for the Number of Timer Timeouts that occurred waiting for Disposition
28	0	8	None	CUTD_INV_EVENT_RCVD_ERR_C	UInt8	None	Counter for the Number of Unexpected Events Received
29	0	8	None	CUTD_INV_FWL_MSGID_ERR_CN	UInt8	None	Counter for the Number of messages received on the FWL_CMD_Q that have a msgid other than what's expected.
30	0	8	None	CUTD_FWL_STATUS_ERR_CNT	UInt8	None	Counter for the Number of Invalid CDUSTATUS messages detected (i.e. CRC bit set to FAILURE)
31	0	8	None	CUTD_INV_TF_HDR_ERR_CNT	UInt8	None	Counter for the Number of invalid CCSDS Telecommand Transfer Frame headers
32	0	8	None	CUTD_INV_CMD_HDR_ERR_CNT	UInt8	None	Counter for the Number of invalid CCSDS Telecommand Packet headers
33	0	8	None	CUTD_MAIN_EF_WAIT_ERR_CNT	UInt8	None	Counter for the Number of failures from the EF_Wait() call in the main loop
34	0	8	None	CUTD_WAIT_EF_WAIT_ERR_CNT	UInt8	None	Counter for the Number of failures from the EF_Wait() call in the Wait For Disposition loop
35	0	8	None	CUTD_INV_TSK_REQ_OPT_ERR_C NT	UInt8	None	Counter for the Number of Invalid TASK_REQ Subid detected.
36	0	8	None	CUTD_INV_UPLINK_CMD_ERR_C	UInt8	None	Counter for the Number of Invalid command with a Route Code of CDU_CMD_Q, but the Uplink Task doesn't know how to process the command.
37	0	8	None	CUTD_SAM_PUT_CMD_ERR_CNT	UInt8	None	Counter for the Number of failures from SAM_Put() for commands.
38	0	8	None	CUTD_SAM_PUT_BLK_ERR_CNT	UInt8	None	Counter for the Number of failures from SAM_Put() for

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							block loads
39	0	8	None	CUTD_SAM_PUT_FWL_ERR_CNT	UInt8	None	Counter for the Number of failures from SAM_Put() queuing messages from the FWL to the FWL_CMD_Q.
40	0	8	None	CUTD_SAM_GET_DISP_ERR_CNT	UInt8	None	Counter for the Number of failures from SAM_Get() attempting to get a disposition message from the SAM queue.
41	0	8	None	CUTD_GET_MAX_EXEC_TIME_ER	UInt8	None	Counter for the Number of failures from the SAMCH_GetMaxExecTime() function call.
42	0	8	None	CUTD_TIM_SHC_REL_ERR_CNT	UInt8	None	Counter for the Number of failures from the TIM_ScheduleRel() call setting up the Timer for Disposition Timeout event.
43	0	8	None	CUTD_EF_CLR_TIM_ERR_CNT_1	UInt8	None	Counter for the Number of failures from EF_Clear() for CMD_UPLINK_TIMER_EF event.
44	0	8	None	CUTD_EF_CLR_TIM_ERR_CNT_2	UInt8	None	Counter for the Number of failures from EF_Clear() for CMD_UPLINK_TIMER_EF event.
45	0	8	None	CUTD_EF_CLEAR_DISP_ERR_CN	UInt8	None	Counter for the Number of failures from EF_Clear() for DISPOSITION_CMD_Q_EF event.
46	0	8	None	CUTD_EF_CLEAR_INTRA_ERR_C	UInt8	None	Counter for the Number of failures from EF_Clear() for INTRA_ISC_CMD_Q_EF event.
47	0	8	None	CUTD_EF_CLEAR_FWL_ERR_CNT	UInt8	None	Counter for the Number of failures from EF_Clear() for CMD_UPLINK_TIMER_EF event.
48	0	8	None	CUTD_EF_CLEAR_SCS_ERR_CNT	UInt8	None	Counter for the Number of failures from EF_Clear() for SCS_COMMAND_Q_EF event.
49	0	8	None	CUTD_TIM_EF_ADD_LST_ERR_C	UInt8	None	Counter for the Number of failures adding the CMD_UPLINK_TIMER_EF to the event flag Mask.
50	0	8	None	CUTD_DISP_SIZE_ERR_CNT	UInt8	None	Counter for the Number of failures detected for Invalid message sizes for the data received on the DISPOSITION_Q
51	0	8	None	CUTD_SEQUENCE_ERR_CNT	UInt8	None	Counter for the Number of Out-of-Sequence Disposition messages received on the DISPOSITION_Q
52	0	8	None	CUTD_BLK_LOAD_SEQ_ERR_CNT	UInt8	None	Counter for the Number of Out-of-Sequence Block Load Packets Failures
53	0	8	None	CUTD_AUTHEN_ERR_CNT	UInt8	None	Counter for the Number of failures authenticating the command
54	0	8	None	CUTD_SAMCH_FWL_ERR_CNT	UInt8	None	Counter for the Number of failures validating the SAM Characteristics for a command received from the forward link
55	0	8	None	CUTD_SAMCH_SCS_ERR_CNT	UInt8	None	Counter for the Number of validating the SAM Characteristics for a command received from the Stored Command Sequence queue
56	0	8	None	CUTD_SAMCH_INTRA_ERR_CNT	UInt8	None	Counter for the Number of validating the SAM Characteristics for a command received from the Intra ISC command queue

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
57	0	8	None	CUTD_INV_CMD_DATA_SRC_ERR	UInt8	None	Counter for the Number of failures determining the Command Data Source.
58	0	8	None	CUTD_SEQUENCE	UInt8	None	Sequence counter for SAM messages sent out from Uplink
59	0	8	None	CUTD_UPNEXP_DISP_CNT	UInt8	None	Counter for the Number of Unexpected Disposition messages received by the Uplink task
60	0	8	None	CUTD_BLK_LOAD_NOT_ENAB_CN	UInt8	None	Counter for the Number of times a block load command was received when the Uplink Task was NOT in a Block Load State.
61	0	8	None	CUTD_BLK_LOAD_MISMATCH	UInt8	None	Counter for the Number of block load command with wrong sequence number
62	0	8	None	CUTD_COMPLETE_BLK_LOAD_CN	UInt8	None	Number of Complete Block Loads loaded
63	0	8	None	CUTD_AUTHEN_BYPASS_CNT	UInt8	None	Number of BYPASS commands received
64	0	8	None	CUTD_NOOP_CMD_CNT	UInt8	None	Number of NOOP commands received
65	0	8	None	CUTD_MEM_BLE_CMD_CNT	UInt8	None	Number of MEM_BLE commands received
66	0	8	None	CUTD_SET_AUTH_CMD_CNT	UInt8	None	Number of SET_AUTH commands received
67	0	8	None	CUTD_OBJ_BLE_CMD_CNT	UInt8	None	Number of OBJ_BLE commands received
68	0	8	None	CUTD_PEND_SCS_CMDS	UInt8	None	Number of commands pending in the SCS queue.
69	0	8	None	CUTD_PEND_INTRA_CMDS	UInt8	None	Number of commands pending in the intra ISC queue.
70	0	8	None	CUTD_PEND_FWL_CMDS	UInt8	None	Number of commands pending in the FWL queue.
71	0	8	None	CUTD_SPARE	UInt8	None	Reserved.

3.3.2.1.2.1.9 Event API Diagnostic Packet (EVENT_API_DIAG)

The Event API Diagnostic Packet

Name: *EVENT_API_DIAG*
Application ID: *779*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *27*

Interface Definition 3-55 EVENT_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	779	Application Identifier for telemetry packet.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
4	7	9	None	PACKET_LENGTH	UInt16	27	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - GLOBAL 2 - BLOCK_0 3 - BLOCK_1 4 - BLOCK_2 5 - BLOCK_3 6 - BLOCK_4 7 - BLOCK_5 8 - BLOCK_6 9 - BLOCK_7 10 - BLOCK_8 11 - BLOCK_9 12 - BLOCK_10 13 - BLOCK_11 14 - BLOCK_12 15 - BLOCK_13 16 - BLOCK_14 17 - BLOCK_15 18 - BLOCK_16	Application packet sub-identifier. 1) Global event flag data. EAD_EVENT_FLAGS is global state of event flags. All other data invalid. 2) Wait block data. EAD_EVENT_FLAGS is sleep mask. 3) Wait block data. EAD_EVENT_FLAGS is sleep mask. 4) Wait block data. EAD_EVENT_FLAGS is sleep mask. 5) Wait block data. EAD_EVENT_FLAGS is sleep mask. 6) Wait block data. EAD_EVENT_FLAGS is sleep mask. 7) Wait block data. EAD_EVENT_FLAGS is sleep mask. 8) Wait block data. EAD_EVENT_FLAGS is sleep mask. 9) Wait block data. EAD_EVENT_FLAGS is sleep mask. 10) Wait block data. EAD_EVENT_FLAGS is sleep mask. 11) Wait block data. EAD_EVENT_FLAGS is sleep mask. 12) Wait block data. EAD_EVENT_FLAGS is sleep mask. 13) Wait block data. EAD_EVENT_FLAGS is sleep mask. 14) Wait block data. EAD_EVENT_FLAGS is sleep mask. 15) Wait block data. EAD_EVENT_FLAGS is sleep mask. 16) Wait block data. EAD_EVENT_FLAGS is sleep mask. 17) Wait block data. EAD_EVENT_FLAGS is sleep mask. 18) Wait block data. EAD_EVENT_FLAGS is sleep mask.
10	0	32	None	EAD_TID	UInt32	None	Task id using wait block. Set to 0 if wait block no in use. Not valid for subid EVENT_API_DIAG_GLOBAL.
14	0	8	(18)	EAD_EVENT_FLAGS	UInt8	None	Event Flag states. For subid EVENT_API_DIAG_GLOBAL, this is the global state of the event flags. For the "BLOCK" subids, this is the sleep mask for that wait block. One bit per event flag. LSB of index 0 is event flag 0, MSB of index 0 is event flag 7. LSB of index 1 is event flag 8, etc.
32	0	16	None	EAD_SPARE_1	UInt16	None	Reserved.

3.3.2.1.2.1.10 Event Log API Diagnostic Packet (EVT_LOG_API_DIAG)

The Event Log Application Programmers Interface Diagnostic Packet

Name: *EVT_LOG_API_DIAG*
Application ID: *793*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *23*

Interface Definition 3-56 EVT_LOG_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	793	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	23	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	ELAD_DISABLED_EVENT_COUNT	UInt16	None	Number of events disabled for downlink. Will wrap around from 65535 to zero.
12	0	16	None	ELAD_ENABLED_EVENT_COUNT	UInt16	None	Number of events enabled for downlink. Will wrap around from 65535 to zero.
14	0	16	(4)	ELAD_STATUS_SUMMARY_BITS	UInt16	See Interface Definition 3-57 Status Summary Data	Status summary bits (64 bits).
22	0	16	None	ELAD_EVENT_COUNT	UInt16	None	Number of events logged. Will wrap around from 65535 to zero.
24	0	16	None	ELAD_LOST_EVENT_COUNT	UInt16	None	Number of events reported but not logged due to log locked or full. Will wrap around from 65535 to zero.
26	0	16	None	ELAD_LOST_INT_EVT CNT	UInt16	None	Number of events lost prior to event log initialization. This indicates an overflow in the internal queue that is used prior to event log initialization.
28	0	16	None	ELAD_INT_EVT CNT	UInt16	None	Count of events queued internally prior to event log initialization.

3.3.2.1.2.1.11 Interrupt Service Routine API Diagnostic Packet (ISR_API_DIAG)

The Interrupt Service Routine Application Programmers Interface Diagnostic Packet

Name: *ISR_API_DIAG*
Application ID: *701*
Virtual Channel: *9*

Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *35*

Interface Definition 3-57 ISR_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	701	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	35	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	(5)	IAD_PANIC_MASK	UInt32	None	Array of interrupt mask registers that have where panic has been detected. This is a circular queue and will wrap. IAS_PANIC counts panics and can be used to find the last panic in this array.
30	0	16	(5)	IAD_PANIC_BIT	UInt16	None	Array of interrupt bit masks that have where panic has been detected. This is a circular queue and will wrap. IAS_PANIC counts panics and can be used to find the last panic in this array.
40	0	16	None	IAD_SPARE	UInt16	None	Reserved.

3.3.2.1.2.1.12 Interrupt Service Routine Count Diagnostic Packet (ISR_COUNT_DIAG)

The Interrupt Service Routine Count Diagnostic Packet

Name: *ISR_COUNT_DIAG*
Application ID: *703*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *139*

Interface Definition 3-58 ISR_COUNT_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	703	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	139	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - CURRENT_PAGE_1 1 - CURRENT_PAGE_2 2 - CURRENT_PAGE_3 3 - CURRENT_PAGE_4 4 - LATCH_PAGE_1 5 - LATCH_PAGE_2 6 - LATCH_PAGE_3 7 - LATCH_PAGE_4	Application packet sub-identifier. 0) Current interrupt counts, page 1. 1) Current interrupt counts, page 2. 2) Current interrupt counts, page 3. 3) Current interrupt counts, page 4. 4) Latched interrupt counts, page 1. 5) Latched interrupt counts, page 2. 6) Latched interrupt counts, page 3. 7) Latched interrupt counts, page 4.
10	0	64	None	ICD_TIME	Time	None	Set to 0 for ISR_COUNT_DIAG_CURRENT_* subids. For ISR_COUNT_DIAG_LATCH_* subids, this field contains the time of the data latch.
18	0	32	(25)	ICD_COUNT	IEEE32	None	Count of interrupts, either latched or just current count.
118	0	8	(25)	ICD_ID	UInt8	0 - R3000_SPURIOUS 1 - FPU_SPURIOUS 2 - RHC3001_SPURIOUS 3 - USR_INT_0 32 - TIMER_3_EOC 33 - TIMER_2_EOC 34 - CDU_VIRQ 35 - CDUA_PKT_RCVD 36 - CDUB_PKT_RCVD	Interrupt ID.
143	0	8	(3)	ICD_SPARE	UInt8	None	Reserved.

3.3.2.1.2.1.13 Log Diagnostics Packet (LOG_DIAG)

The Log Diagnostics Packet

Name: LOG_DIAG
Application ID: 704
Virtual Channel: 9
Boot: True
Operational: True
Timeout (seconds): 30

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Packet Length: 51

Interface Definition 3-59 LOG_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	704	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	51	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - TLM 2 - EVT 3 - CMD 4 - SCS 5 - STDOUT 6 - DIAGLOG	Application packet sub-identifier. 1) Data applies to telemetry log. 2) Data applies to event log. 3) Data applies to command log. 4) Data applies to SCS log. 5) Data applies to standard out log. 6) Data applies to diagnostics log.
10	0	64	None	LD_START_TIME	Time	Valid GPS time	Start time for log
18	0	64	None	LD_END_TIME	Time	Valid GPS time	End time for log.
26	0	32	None	LD_LOG_BYTES_USED	UInt32	None	Actual number of bytes located in the specific log
30	0	8	None	LD_LOG_INIT_ERR	UInt8	None	Number of errors initializing a specific log
31	0	8	None	LD_PUT_INV_LEN_ERR	UInt8	None	Number of errors for invalid length?s for a LOG_Put() function.
32	0	8	None	LD_LOG_NUM_LCK_FAIL	UInt8	None	TBS
33	0	8	None	LD_PUT_FULL_ERR	UInt8	None	TBS
34	0	8	None	LD_LCK_INFO_DMP_ERR	UInt8	None	Number of errors attempting to get Lock status for a specific log attempting to DUMP a log.
35	0	8	None	LD_LCK_LOG_DMP_ERR	UInt8	None	Number of errors attempting to LOCK a log when attempting to DUMP.
36	0	8	None	LD_LCK_INFO_RUN_ERR	UInt8	None	Number of errors attempting to get Lock status for a specific log attempting to put a log into a RUN state.
37	0	8	None	LD_UNLCK_LOG_RUN_ERR	UInt8	None	Number of errors attempting to UNLOCK the log when going into a RUN state.
38	0	8	None	LD_LCK_INFO_STP_ERR	UInt8	None	Number of errors attempting to get Lock status for a specific log attempting to STOP a log.
39	0	8	None	LD_LCK_LOG_STP_ERR	UInt8	None	Number of errors attempting to LOCK the log
40	0	8	None	LD_LCK_INFO_PREV_ERR	UInt8	None	Number of errors getting LOCK status of a specific log when returning to a previous state.
41	0	8	None	LD_INV_PREV_ST_LK_ERR	UInt8	None	Number of errors Locking the log when returning to a previous state.
42	0	8	None	LD_INV_PREV_ST_UNLK_ERR	UInt8	None	Number of errors Unlocking the log when returning to a previous state.
43	0	8	None	LD_INV_PREV_ST_DMP_ERR	UInt8	None	Number of errors detecting a previous state of DUMP.
44	0	8	None	LD_INV_PREV_ST_PRE_ERR	UInt8	None	TBS

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
45	0	8	None	LD_LOG_NUM_UNLCK_SUCC	UInt8	None	TBS
46	0	8	None	LD_INV_PREV_ST_UKN_ERR	UInt8	None	TBS
47	0	8	None	LD_LOG_NUM_UNLCK_FAIL	UInt8	None	TBS
48	0	8	None	LD_INV_NEW_STATE_ERR	UInt8	None	TBS
49	0	8	None	LD_INV_ITEM_REQ_ERR	UInt8	None	TBS
50	0	8	None	LD_LOG_NUM_LCK_SUCC	UInt8	None	TBS
51	0	8	(7)	LD_SPARE	UInt8	None	Reserved.

3.3.2.1.2.1.14 Memory API Diagnostic Packet (MEM_API_DIAG)

The Memory Application Programmers Interface Diagnostic Packet

Name: *MEM_API_DIAG*
Application ID: *707*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *35*

Interface Definition 3-60 MEM_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	707	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	35	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	MED_LAST_EEPROM_ADDR_LOAD	UInt32	None	Start Address of last EEPROM load.
14	0	32	None	MED_LAST_EEPROM_DATA_LEN	UInt32	None	Length of last EEPROM load.
18	0	32	None	MED_LAST_EEPROM_PACK_CNT	UInt32	None	Packet count of last EEPROM load.
22	0	32	None	MED_LAST_RAM_ADDR_LOAD	UInt32	None	Start Address of last RAM load.
26	0	32	None	MED_LAST_RAM_DATA_LEN	UInt32	None	Length of last RAM load.
30	0	32	None	MED_LAST_RAM_PACK_CNT	UInt32	None	Packet count of last RAM load.
34	0	8	None	MED_EDAC_ENABLE_CNT	UInt8	None	Counter for EEPROM EDAC enables.
35	0	8	None	MED_EDAC_DISABLE_CNT	UInt8	None	Counter for EEPROM EDAC disables.
36	0	8	None	MED_TOT_NUM_RAM_LOADS	UInt8	None	Total number of complete RAM loads. This value will be

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							incremented even if the checksum fails.
37	0	8	None	MED_TOT_NUM_RAM_ABORTS	UInt8	None	Total number of aborts during RAM loads.
38	0	8	None	MED_TOT_NUM_EEPROM_LOADS	UInt8	None	Total number of complete EEPROM loads. This value will be incremented even if the checksum fails.
39	0	8	None	MED_TOT_NUM_EEPROM_ABORTS	UInt8	None	Total number of aborts during EEPROM loads.
40	0	16	None	MED_SPARE	UInt16	None	Reserved.

3.3.2.1.2.1.15 Memory Dump API Diagnostic Packet (MEM_DUMP_API_DIAG)

The Memory Dump Application Programmers Interface Diagnostic Packet

Name: *MEM_DUMP_API_DIAG*
Application ID: *709*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *131*

Interface Definition 3-61 MEM_DUMP_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	709	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	131	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	64	None	MDAD_LOG_START_TIME	Time	None	The start time associated with the current log dump.
18	0	64	None	MDAD_LOG_END_TIME	Time	None	The end time associated with the current log dump.
26	0	32	None	MDAD_LOG_SEG1_ADDR	UInt32	None	Log segment #1 start absolute address
30	0	32	None	MDAD_LOG_SEG1_BYTES	UInt32	None	Log segment #1 length in bytes
34	0	32	None	MDAD_LOG_SEG2_ADDR	UInt32	None	Log segment #2 start absolute address
38	0	32	None	MDAD_LOG_SEG2_BYTES	UInt32	None	Log segment #2 length in bytes
42	0	16	None	MDAD_OBJECT_ID	UInt16	10 - NumberOfObjects	If Object Dump, Object Id
44	0	16	None	MDAD_OBJECT_INST	UInt16	0 - 5	If Object Dump, Object slot
46	0	16	None	MDAD_OBJECT_VERSION	UInt16	None	If Object Dump, Object Version Number
48	0	16	None	MDAD_SCS_TYPE	UInt16	None	Reserved.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
50	0	16	None	MDAD_SCS_RESID	UInt16	0 - 699	SCL Resource Dump Resource Id (resid)
52	0	16	None	MDAD_SEQ_COUNT	UInt16	None	Current sequence count in downlink packet.
54	0	8	None	MDAD_DUMP_TYPE	UInt8	1 - MEMORY 2 - LOG 3 - OBJECT 4 - SCS	Current dump type. 1) Memory Range (EEPROM or RAM) 2) Log 3) Parameter Table Object 4) Stored Command Sequence
55	0	8	None	MDAD_DUMP_SUBTYPE	UInt8	TBS	TBS
56	0	8	None	MDAD_MEMORY_SELECT	UInt8	0xFE - EEPROM memory 0xFF - RAM memory	EEPROM or RAM memory dumping
57	0	8	None	MDAD_LOG_SELECT	UInt8	0 - INVALID 1 - TELEM_LOG 2 - EVT_LOG 3 - CMD_LOG 4 - SCS_LOG 5 - STDOUT_LOG 6 - DIAG_LOG 255 - INVALID	If log dump, current log being dumped 0) Invalid 1) Telemetry Log 2) Event Log 3) Command Log 4) SCL Log 5) STDOUT Log 6) Diagnostic Log 255) Invalid
58	0	8	(2)	MDAD_SPARE	UInt8	None	Reserved.

3.3.2.1.2.1.16 Memory Manager Task Diagnostic Packet (MEM_MGR_DIAG)

The Memory Manager Task Diagnostic Packet is used to

- Name:** *MEM_MGR_DIAG*
- Application ID:** *780*
- Virtual Channel:** *9*
- Boot:** *True*
- Operational:** *True*
- Timeout (seconds):** *2*
- Packet Length:** *64*

Interface Definition 3-62 MEM_MGR_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	780	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	64	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	MMD_TIMER_COUNT	UInt16	None	Counter for the number of times the Memory Manager task woke up without any messages to process (i.e. TIMEOUT from EF_Wait()) This timeout is used to keep SOH & Diagnostic messages up to date.
12	0	16	None	MMD_CMD_QUEUE_COUNT	UInt16	None	Number of commands handled by memory manager.
14	0	8	None	MMD_NOOP_COUNT	UInt8	None	Number of NOOPs received.
15	0	8	None	MMD_MEM_DUMP_COUNT	UInt8	None	Number of memory dump commands received
16	0	8	None	MMD_OBJ_DUMP_CNT	UInt8	None	Number of object dump commands received.
17	0	8	None	MMD_CAN_DUMP_CNT	UInt8	None	Number of cancel dump commands received.
18	0	8	None	MMD_SCS_DUMP_CNT	UInt8	None	Number of stored command sequence dump commands received.
19	0	8	None	MMD_LOG_CTL_START_S_CNT	UInt8	None	Number of log control start / SOF commands received.
20	0	8	None	MMD_LOG_CTL_START_O_CNT	UInt8	None	Number of log control start / OOF commands received.
21	0	8	None	MMD_LOG_STOP_CNT	UInt8	None	Number of log control stop commands received.
22	0	8	None	MMD_LOG_CLEAR_CNT	UInt8	None	Number of log control clear commands received.
23	0	8	None	MMD_LOG_DUMP_CNT	UInt8	None	Number of log control dump commands received.
24	0	8	None	MMD_MEM_LOAD_CNT	UInt8	None	Number of memory load commands received.
25	0	8	None	MMD_MEM_BLE_CNT	UInt8	None	Number of memory block load enable commands received.
26	0	8	None	MMD_OBJ_LOAD_CNT	UInt8	None	Number of object block load commands received.
27	0	8	None	MMD_OBJ_BLE_CNT	UInt8	None	Number of object block load enabled commands received.
28	0	8	None	MMD_OBJ_CTRL_CNT	UInt8	None	Number of object control commands received.
29	0	8	None	MMD_ABORT_CNT	UInt8	None	Number of abort commands received.
30	0	8	None	MMD_EVENT_CTL_CNT	UInt8	None	Number of event control commands received.
31	0	8	None	MMD_NUM_COMP_NUMP_STARTS	UInt8	None	Number of Compression Dump Start request made.
32	0	8	None	MMD_SRT_COMP_TASK_ERR_CNT	UInt8	None	Number of Compression Dump Start Errors
33	0	8	None	MMD_LOG_DUMP_INFO_ERR_CNT	UInt8	None	Number of Log Dump Failures for Compressed Log Dumps
34	0	8	None	MMD_EPMTY_LOG_DMP_ERR_CNT	UInt8	None	Number of Log Compressed Dump request made for

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							Empty Logs
35	0	8	None	MMD_TSK_REQ_OPT_ERR_CNT	UInt8	None	Number of Task Request with Invalid Subid's provided
36	0	8	None	MMD_LOG_CTL_SEL_ERR_CNT	UInt8	None	Number of Invalid Log Control Selection Parameter
37	0	8	None	MMD_LOG_CTL_STP_ERR_CNT	UInt8	None	Number of Failures executing a Log Control STOP command
38	0	8	None	MMD_LOG_DUMP_COMP_CNT	UInt8	None	Number of Log Compression Dump Request detected
39	0	8	None	MMD_NUM_STOP_COMP	UInt8	None	Number of Stop Compression request issued because of a new Dump Request
40	0	8	None	MMD_STOP_COMP_ERR_CNT	UInt8	None	Number of failures attempting to stop a log compression
41	0	8	None	MMD_START_COMP_ERR_CNT	UInt8	None	Number of failures attempting to start a log compression
42	0	8	None	MMD_LOG_CTL_DUMP_ERR_CNT	UInt8	None	Number of failure attempting to Dump a log
43	0	8	None	MMD_LOG_CTL_STR_ERR_CNT	UInt8	None	Number of failures attempting to Start a log
44	0	8	None	MMD_LOG_CTL_CLR_ERR_CNT	UInt8	None	Number of failures attempting to Clear a log
45	0	8	None	MMD_LOG_CTL_SID_ERR_CNT	UInt8	None	Number of Bad Log Control Subid's detected
46	0	8	None	MMD_MEM_ABT_SID_ERR_CNT	UInt8	None	Number of Bad Memory Abort Subid's detected
47	0	8	None	MMD_OBJ_SEL_BS_ERR_CNT	UInt8	None	Number of Bad State Failures detected while attempting to Select an Object
48	0	8	None	MMD_OBJ_SEL_BT_ERR_CNT	UInt8	None	Number of failures detected while searching the Object Table for the given object in the Object Select command
49	0	8	None	MMD_OBJ_SEL_BTS_ERR_CNT	UInt8	None	Number of bad Type/Slot parameters detected for a Object Select command
50	0	8	None	MMD_OBJ_BLE_ERR_CNT	UInt8	None	Number of failures executing an Object Block Load Enable command
51	0	8	None	MMD_OBJ_CTRL_ERR_CNT	UInt8	None	Number of failures executing an Object Control command (Not Select Command)
52	0	8	None	MMD_OBJ_LOAD_ERR_CNT	UInt8	None	Number of failures executing an Object Load command
53	0	8	None	MMD_OBJ_DUMP_ERR_CNT	UInt8	None	Number of failures executing an Object Dump command
54	0	8	None	MMD_CAN_DUMP_ERR_CNT	UInt8	None	Number of failures executing an Cancel Dump command
55	0	8	None	MMD_MEM_DUMP_ERR_CNT	UInt8	None	Number of failures executing a Memory Dump command
56	0	8	None	MMD_SCS_DUMP_ERR_CNT	UInt8	None	Number of failures executing a SCS Memory Dump command
57	0	8	None	MMD_EVT_CTL_ERR_CNT	UInt8	None	Number of failures executing a Event Control command
58	0	8	None	MMD_INV_MSG_ERR_CNT	UInt8	None	Number of Invalid Msg ID's detected by memory manager
59	0	8	None	MMD_EF_WAIT_ERR_CNT	UInt8	None	Number of EF_Wait() failures detected in Memory Manager
60	0	8	None	MMD_EF_CLR_MCMDQ_ERR_CNT	UInt8	None	Number of failures attempting to Clear the MEM_CMD_Q_EF event
61	0	8	None	MMD_UPL_SND_DISP_ERR_CNT	UInt8	None	Number of failures attempting to send a disposition response to the Command Uplink Task
62	0	8	None	MMD_SAM_GET_ERR_CNT	UInt8	None	Number of failures attempting to get a command from the

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							MEM_CMD_Q SAM Queue
63	0	8	None	MMD_EF_CLR_COMP_ERR_CNT	UInt8	None	Number of failures attempting to clear the Log Compression Complete event
64	0	8	None	MMD_NUM_LOG_COMP_EF	UInt8	None	Number of Log Compression Complete Events received
65	0	8	None	MMD_NUM_LOG_DMP_COMP_DONE	UInt8	None	Number of Successful Log Compressions executed
66	0	8	None	MMD_NUM_LOG_CDMP_ERR_CNT	UInt8	None	Number of Failures Retrieving the Compression Data for Dumping
67	0	8	None	MMD_UNEXP_LOG_COMP_EF_CNT	UInt8	None	Number of unexpected Log Compression Complete Events received
68	0	8	None	MMD_MEM_BLE_ERR_CNT	UInt8	None	Number of failures executing a Memory Load Enable command
69	0	8	None	MMD_MEM_LOAD_ERR_CNT	UInt8	None	Number of failures executing a Memory Load command
70	0	8	None	MEM_SPARED	UInt8	None	Reserved.

3.3.2.1.2.1.17 Mutex API Diagnostic Packet (MTX_API_DIAG)

Mutex Application Programmers Interface Diagnostic Packet

Name: *MTX_API_DIAG*
Application ID: *720*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *103*

Interface Definition 3-63 MTX_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	720	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	103	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - SUB_HITS 2 - SUB_LOCK 3 - SUB_UNLOCK	Application packet sub-identifier. 1) Data array represents mutex collisions detected. 2) Data array represents number of lock calls made. 3) Data array represents number of unlock calls made.
10	0	8	(100)	MAD_ARRAY	UInt8	None	Array of mutex resources.

3.3.2.1.2.1.18 Object API Diagnostic Packet (OBJ_API_DIAG)

The Object Application Programmers Interface Diagnostic Packet provides a directory of objects.

Name: OBJ_API_DIAG
Application ID: 721
Virtual Channel: 9
Boot: True
Operational: True
Timeout (seconds): 30
Packet Length: 111

Interface Definition 3-64 OBJ_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	721	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	111	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_ONE 1 - SUB_TWO 2 - SUB_THREE 3 - SUB_FOUR 4 - SUB_FIVE 5 - SUB_SIX 6 - SUB_SEVEN 7 - SUB_EIGHT 8 - SUB_NINE 9 - SUB_TEN 10 - SUB_ELEVEN 11 - SUB_TWELVE 12 - SUB_THIRTEEN 13 - SUB_FOURTEEN 14 - SUB_FIFTEEN 15 - SUB_SIXTEEN 16 - SUB_SEVENTEEN 17 - SUB_EIGHTEEN 18 - SUB_NINETEEN 19 - SUB_TWENTY	Application packet sub-identifier. 0) First page of object diag. 1) Second page of object diag. 2) Third page of object diag. 3) Fourth page of object diag. 4) Fifth page of object diag. 5) Sixth page of object diag. 6) Seventh page of object diag. 7) Eighth page of object diag. 8) Ninth page of object diag. 9) Tenth page of object diag. 10) Eleventh page of object diag. 11) Twelfth page of object diag. 12) Thirteenth page of object diag. 13) Fourteenth page of object diag. 14) Fifteenth page of object diag. 15) Sixteenth page of object diag. 16) Seventeenth page of object diag. 17) Eighteenth page of object diag. 18) Nineteenth page of object diag. 19) Twentieth page of object diag.
10	0	32	(6)	OAD_OBJECT_SADDR	UInt32	None	Starting address for each object.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
34	0	32	(6)	OAD_OBJECT_TIME	LoRes Time	None	Time tag for each object.
58	0	16	(6)	OAD_OBJECT_VERSION	UInt16	None	Version ID for each object.
70	0	16	(6)	OAD_OBJECT_CHECKSUM	UInt16	None	Checksum of each object.
82	0	8	(6)	OAD_OBJECT_TYPE	UInt8	None	Object type array
88	0	8	(6)(4)	OAD_OBJECT_USERS	UInt8	None	Component IDs of tasks currently using objects. First dimension is for up to 4 tasks using the objects.
112	0	8	(3)	OAD_OBJECT_SLOT	UInt8	None	Object slot array. Each byte represents two objects, ordered MSN first, then LSN.
115	0	8	(3)	OAD_OBJECT_STATE	UInt8	State Values: 0000 - Cleared 0001 - Loading 0010 - Dubious 0011 - Ready 0100 - Selected 0101 - Bad 0110 - Selected/Bad 0111 - Ready/Bad (default objects only)	Object state array. Each byte represents two objects, ordered MSN first, then LSN.

3.3.2.1.2.1.19 Object API Directory Diagnostic Packet (OBJ_DIR_DIAG)

The Object Application Programmers Interface Directory Diagnostic Packet provides a mapping for the OBJ_API_DIAG packets

- Name:** *OBJ_DIR_DIAG*
- Application ID:** *724*
- Virtual Channel:** *9*
- Boot:** *True*
- Operational:** *True*
- Timeout (seconds):** *30*
- Packet Length:** *63*

Interface Definition 3-65 OBJ_DIR_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	724	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	63	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							0) Reserved.
10	0	8	(20)	ODD_OBJ_ID	UInt8	None	Object id. 0 indicates unused entry.
30	0	8	(20)	ODD_PAGE	UInt8	None	Page number on which the object in OOD_OBJ_ID starts.
50	0	8	(20)	ODD_OBJ_ENTRY	UInt8	None	Entry on page at which the object in OOD_OBJ_ID starts.

3.3.2.1.2.1.20 RIU Diagnostic Raw Data Packet (RIU_DIAGNOSTIC_DATA)

The RIU Diagnostic Raw Data Packet contains data samples from the RIU diagnostic sample list.

Name: *RIU_DIAGNOSTIC_DATA*
Application ID: *298*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *33*

Interface Definition 3-66 RIU_DIAGNOSTIC_DATA

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	298	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	33	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - RIU_DD_SUB_RIU_1 1 - RIU_DD_SUB_RIU_2	Application packet sub-identifier. 0) Diagnostic sample set from RIU 1 1) Diagnostic sample set from RIU 2
10	0	16	(15)	RIU_DD_WORDS	UInt16	None	RIU diagnostic sample data words.

3.3.2.1.2.1.21 Return Link Table API Diagnostic Packet (RLT_API_DIAG)

Return Link Hardware Interface Diagnostic Telemetry

Name: *RLT_API_DIAG*
Application ID: *726*
Virtual Channel: *9*
Boot: *True*

Operational: *True*
Timeout (seconds): *30*
Packet Length: *31*

Interface Definition 3-67 RLT_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	726	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	31	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	RAD_PUTS	UInt32	None	Number of RLT Puts. Rolls over at max value.
14	0	32	None	RAD_TASK_GETS	UInt32	None	Number of successful Gets from the RLT by any task other than the local bus manager. Rolls over at max value.
18	0	32	None	RAD_LBM_GETS	UInt32	None	Number of successful Gets from the RLT by the local bus manager. Rolls over at max value.
22	0	32	None	RAD_NOMINAL	UInt32	None	Number of Get-Put-Get sequences. Rolls over at max value.
26	0	32	None	RAD_MISSED	UInt32	None	Number of Put-Put-Get sequences. Indicates that data is being put into the RLT faster than it is being retrieved. Rolls over at max value.
30	0	32	None	RAD_STALE	UInt32	None	Number of successful Gets from the RLT, but the data was stale. Rolls over at max value.
34	0	32	None	RAD_ERRORS	UInt32	None	Number of internal RLT errors accumulated during Gets or Puts to the RLT. Rolls over at max value.

3.3.2.1.2.1.22 Return Link Table Data State Diagnostic Packet (RLT_DATA_STATE_DIAG)

Attitude Determination And Control Exec Task Diagnostics Telemetry

Name: *RLT_DATA_STATE_DIAG*
Application ID: *728*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *123*

Interface Definition 3-68 RLT_DATA_STATE_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	728	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	123	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - RLT_DATA_STATE_SU B_ISC_A 2 - RLT_DATA_STATE_SU B_ISC_B 3 - RLT_DATA_STATE_SU B_ISC_C 4 - RLT_DATA_STATE_SU B_ISC_D	Application packet sub-identifier. 1) RLT Data from ISC A 2) RLT Data from ISC B 3) RLT Data from ISC C 4) RLT Data from ISC D
10	0	8	(120)	RDSD_DATA	UInt8	00 - No Data 01 - Stale Data 10 - Fresh Data 11 - Missed Data	This array is treated as a stream of bits, meaning that bits 7 and 6 of byte 1 correspond to the first SAM (Msg Id/Sub Id pair) from the RLT, bits 5 and 4 in byte 1 correspond to the second SAM and so on. Each byte of the array contains four SAM states. In order to successfully decommutate this parameter, access to the flight software header file, icm_rlt.h, is required. This file defines the order in which SAMs appear in the RLT.

3.3.2.1.2.1.23 SAM Characteristics API Diagnostic Packet (SAM_CHAR_API_DIAG)

The Standard Asynchronous Message Characteristics API Diagnostic Packet

Name: *SAM_CHAR_API_DIAG*
Application ID: *729*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *41*

Interface Definition 3-69 SAM_CHAR_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	729	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	41	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	SCAD_NUM_INV_RTE_CODE_ERR	UInt16	None	Number of Route Code Errors
12	0	16	None	SCAD_NUM_CS_ERR	UInt16	None	Number of Checksum Errors
14	0	16	None	SCAD_NUM_INV_LEN_ERR	UInt16	None	Number of Invalid Length Errors
16	0	16	None	SCAD_NUM_INV_SUBID_ERR	UInt16	None	Number of Invalid Subid Errors
18	0	16	None	SCAD_NUM_INV_MSGID_ERR	UInt16	None	Number of Invalid Msgid Errors
20	0	16	None	SCAD_NUM_NULL_PTR_ERR	UInt16	None	Number of Null Pointer Errors
22	0	16	None	SCAD_NUM_INV_ENTRY_ERR	UInt16	None	Number of Invalid Entry Errors
24	0	16	None	SCAD_EXP_CS	UInt16	None	Expected Checksum of last checksum error
26	0	16	None	SCAD_ACT_CS	UInt16	None	Actual Checksum of last checksum error
28	0	8	None	SCAD_EXP_ROUTE_CODE	UInt8	See Table 3-4, Application Process ID Assignments	Expected route code of last route code error
29	0	8	None	SCAD_ACT_ROUTE_CODE	UInt8	None	Actual route code of last route code error.
30	0	8	None	SCAD_EXP_MIN_LEN	UInt8	None	Min length of last length error.
31	0	8	None	SCAD_EXP_MAX_LEN	UInt8	None	Max length of last length error.
32	0	8	None	SCAD_ACT_LEN	UInt8	None	Actual length of last length error
33	0	8	None	SCAD_INV_SUBID	UInt8	None	Last invalid subid
34	0	8	None	SCAD_INV_MSGID	UInt8	None	Last invalid msgid
35	0	8	None	SCAD_INV_ENTRY	UInt8	None	Last Invalid Entry
36	0	8	None	SCAD_INV_RTE_CODE_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR	Component ID of last task reporting route code error 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
37	0	8	None	SCAD_CS_ERR_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR	Component ID of last task reporting checksum error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
38	0	8	None	SCAD_INV_LEN_TASK	UInt8	9 - UNKNOWN_TASK	Component ID of last task reporting length

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF	error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
39	0	8	None	SCAD_INV_SUBID_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API	Component ID of last task reporting subid error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
40	0	8	None	SCAD_INV_MSGID_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API	Component ID of last task reporting msgid error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
41	0	8	None	SCAD_NULL_PTR_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API	Component ID of last task reporting null pointer error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
42	0	8	None	SCAD_INV_ENTRY_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR	Component ID of last task reporting invalid entry error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
43	0	8	None	SCAD_NUM_OOR_MSGID	UInt8	None	Number of out-of-range msgid errors.
44	0	8	None	SCAD_OOR_MSGID	UInt8	None	Last out-of-range msgid.
45	0	8	None	SCAD_OOR_MSGID_ERR_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR	Last task reporting out-of-range message. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
46	0	16	None	SCAD_TOT_ERR_CNT	UInt16	None	Number of SAM characteristic errors.

3.3.2.1.2.1.24 SSPM Register Diagnostic Packet (SSPM_REG_DIAG)

The SSPM Register Diagnostic Packet

Name: *SSPM_REG_DIAG*
Application ID: *732*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *19*

Interface Definition 3-70 SSPM_REG_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	732	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	19	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	SRD_RHC3001_EDAC_LOG	UInt32	None	RHC3001 EDAC Logging Register.
14	0	32	None	SRD_RHC3001_EDAC_ADDR	UInt32	None	RHC3001 EDAC error address.
18	0	32	None	SRD_RHC3001_INT_MASK	UInt32	None	RHC3001 Interrupt Mask Register.
22	0	8	None	SRD_VREG_MISC	UInt8	None	VREG Miscellaneous Register
23	0	8	None	SRD_VREG_INT_MASK	UInt8	None	VREG Interrupt Mask Register
24	0	16	None	SRD_SPARE	UInt16	None	Reserved.

3.3.2.1.2.1.25 Task Manager Common Diagnostic Packet (TASK_MGR_COMMON_DIAG)

The Task Manager Common Diagnostic Packet is used to

Name: *TASK_MGR_COMMON_DIAG*
Application ID: *711*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*

Packet Length: 83

Interface Definition 3-71 TASK_MGR_COMMON_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	711	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	83	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30	Application packet sub-identifier. 1) Task 1 Diagnostics 2) Task 2 Diagnostics 3) Task 3 Diagnostics 4) Task 4 Diagnostics 5) Task 5 Diagnostics 6) Task 6 Diagnostics 7) Task 7 Diagnostics 8) Task 8 Diagnostics 9) Task 9 Diagnostics 10) Task 10 Diagnostics 11) Task 11 Diagnostics 12) Task 12 Diagnostics 13) Task 13 Diagnostics 14) Task 14 Diagnostics 15) Task 15 Diagnostics 16) Task 16 Diagnostics 17) Task 17 Diagnostics 18) Task 18 Diagnostics 19) Task 19 Diagnostics 20) Task 20 Diagnostics 21) Task 21 Diagnostics 22) Task 22 Diagnostics 23) Task 23 Diagnostics 24) Task 24 Diagnostics 25) Task 25 Diagnostics 26) Task 26 Diagnostics 27) Task 27 Diagnostics 28) Task 28 Diagnostics 29) Task 29 Diagnostics 30) Task 30 Diagnostics
10	0	32	None	TMCD_TID	UInt32	None	Task ID of selected task.
14	0	32	None	TMCD_OPTIONS	Int32	None	TBS
18	0	32	None	TMCD_ENTRY	UInt32	None	TBS
22	0	32	None	TMCD_STACK_POINTER	UInt32	None	TBS

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
26	0	32	None	TMCD_STACK_BASE	UInt32	None	TBS
30	0	32	None	TMCD_STACK_LIMIT	UInt32	None	TBS
34	0	32	None	TMCD_STACK_SIZE	Int32	None	TBS
38	0	32	None	TMCD_STACK_CURRENT	Int32	None	TBS
42	0	32	None	TMCD_STACK_HIGH	Int32	None	TBS
46	0	32	None	TMCD_ERROR_STATUS	Int32	None	TBS
50	0	32	None	TMCD_DELAY	Int32	None	TBS
54	0	32	None	TMCD_PRI_NORMAL	UInt32	None	TBS
58	0	32	None	TMCD_PRI_MUTEX_CNT	UInt32	None	TBS
62	0	32	None	TMCD_SAFE_CNT	UInt32	None	TBS
66	0	32	None	TMCD_EXIT_CODE	Int32	None	TBS
70	0	32	None	TMCD_TASK_TICKS	UInt32	None	TBS
74	0	32	None	TMCD_P_TASK_VAR	UInt32	None	TBS
78	0	32	None	TMCD_P_FP_CONTEXT	UInt32	None	TBS
82	0	16	None	TMCD_SWAP_IN_MASK	UInt16	None	TBS
84	0	16	None	TMCD_SWAP_OUT_MASK	UInt16	None	TBS
86	0	8	None	TMCD_COMP_ID	UInt8	None	TBS
87	0	8	None	TMCD_PRIORITY	Int8	None	TBS
88	0	8	None	TMCD_STATUS	Int8	None	TBS
89	0	8	None	TMCD_SPARE	UInt8	None	Reserved.

3.3.2.1.2.1.26 Task Manager Diagnostic Packet (TASK_MGR_DIAG)

The Task Manager Diagnostic Packet is used to

Name: ***TASK_MGR_DIAG***
Application ID: ***754***
Virtual Channel: ***9***
Boot: ***True***
Operational: ***True***
Timeout (seconds): ***2***
Packet Length: ***11***

Interface Definition 3-72 TASK_MGR_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	754	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	11	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	TMD_NOOP_COUNT	UInt32	None	Number of noops received.
14	0	32	None	TMD_RESET_COUNT	UInt32	None	Number of task resets.

3.3.2.1.2.1.27 Task Manager Exception Diagnostic Packet (TASK_MGR_EXC_INFO_DIAG)

The Task Manager Exception Diagnostic Packet is used to

Name: *TASK_MGR_EXC_INFO_DIAG*
Application ID: *755*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *67*

Interface Definition 3-73 TASK_MGR_EXC_INFO_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	755	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	67	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10	Application packet sub-identifier. 1) Task 1 Diagnostics 2) Task 2 Diagnostics 3) Task 3 Diagnostics 4) Task 4 Diagnostics 5) Task 5 Diagnostics 6) Task 6 Diagnostics 7) Task 7 Diagnostics 8) Task 8 Diagnostics 9) Task 9 Diagnostics

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30	10) Task 10 Diagnostics 11) Task 11 Diagnostics 12) Task 12 Diagnostics 13) Task 13 Diagnostics 14) Task 14 Diagnostics 15) Task 15 Diagnostics 16) Task 16 Diagnostics 17) Task 17 Diagnostics 18) Task 18 Diagnostics 19) Task 19 Diagnostics 20) Task 20 Diagnostics 21) Task 21 Diagnostics 22) Task 22 Diagnostics 23) Task 23 Diagnostics 24) Task 24 Diagnostics 25) Task 25 Diagnostics 26) Task 26 Diagnostics 27) Task 27 Diagnostics 28) Task 28 Diagnostics 29) Task 29 Diagnostics 30) Task 30 Diagnostics
10	0	32	None	TMEID_TID	UInt32	None	TBS
14	0	32	None	TMEID_VECTOR_NUM	Int32	None	TBS
18	0	32	None	TMEID_VALID	UInt32	None	Indicates which of the exception fields are valid.
22	0	32	None	TMEID_PARAM_1	UInt32	None	TBS
26	0	32	None	TMEID_PARAM_2	UInt32	None	TBS
30	0	32	None	TMEID_PARAM_3	UInt32	None	TBS
34	0	32	None	TMEID_PARAM_4	UInt32	None	TBS
38	0	32	None	TMEID_ERRNO	UInt32	None	TBS
42	0	32	None	TMEID_CAUSE	UInt32	None	TBS
46	0	32	None	TMEID_CNTXT	UInt32	None	TBS
50	0	32	None	TMEID_FPCSR	UInt32	None	TBS
54	0	32	None	TMEID_BADVA	UInt32	None	TBS
58	0	16	None	TMEID_EID	UInt16	None	TBS
60	0	8	None	TMEID_EXC_PLACEMENT	UInt8	None	TBS
61	0	8	None	TMEID_SPARE	UInt8	None	Reserved.
62	0	32	None	TMEID_EPC	UInt32	None	TBS
66	0	32	None	TMEID_STATUS_REG	UInt32	None	TBS
70	0	32	None	TMEID_EAR	UInt32	None	TBS

3.3.2.1.2.1.28 Task Floating Point Register Diagnostic Packet (TASK_MGR_FPR_DIAG)

The Task Floating Point Register Diagnostic Packet is used to

Name: *TASK_MGR_FPR_DIAG*
Application ID: *756*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *139*

Interface Definition 3-74 TASK_MGR_FPR_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	756	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	139	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24	Application packet sub-identifier. 1) Task 1 Diagnostics 2) Task 2 Diagnostics 3) Task 3 Diagnostics 4) Task 4 Diagnostics 5) Task 5 Diagnostics 6) Task 6 Diagnostics 7) Task 7 Diagnostics 8) Task 8 Diagnostics 9) Task 9 Diagnostics 10) Task 10 Diagnostics 11) Task 11 Diagnostics 12) Task 12 Diagnostics 13) Task 13 Diagnostics 14) Task 14 Diagnostics 15) Task 15 Diagnostics 16) Task 16 Diagnostics 17) Task 17 Diagnostics 18) Task 18 Diagnostics 19) Task 19 Diagnostics 20) Task 20 Diagnostics 21) Task 21 Diagnostics 22) Task 22 Diagnostics 23) Task 23 Diagnostics

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30	24) Task 24 Diagnostics 25) Task 25 Diagnostics 26) Task 26 Diagnostics 27) Task 27 Diagnostics 28) Task 28 Diagnostics 29) Task 29 Diagnostics 30) Task 30 Diagnostics
10	0	64	None	TMFPRD_TID	leee64	None	TBS
18	0	64	None	TMFPRD_FP0_REG	leee64	None	TBS
26	0	64	None	TMFPRD_FP2_REG	leee64	None	TBS
34	0	64	None	TMFPRD_FP4_REG	leee64	None	TBS
42	0	64	None	TMFPRD_FP6_REG	leee64	None	TBS
50	0	64	None	TMFPRD_FP8_REG	leee64	None	TBS
58	0	64	None	TMFPRD_FP10_REG	leee64	None	TBS
66	0	64	None	TMFPRD_FP12_REG	leee64	None	TBS
74	0	64	None	TMFPRD_FP14_REG	leee64	None	TBS
82	0	64	None	TMFPRD_FP16_REG	leee64	None	TBS
90	0	64	None	TMFPRD_FP18_REG	leee64	None	TBS
98	0	64	None	TMFPRD_FP20_REG	leee64	None	TBS
106	0	64	None	TMFPRD_FP22_REG	leee64	None	TBS
114	0	64	None	TMFPRD_FP24_REG	leee64	None	TBS
122	0	64	None	TMFPRD_FP26_REG	leee64	None	TBS
130	0	64	None	TMFPRD_FP28_REG	leee64	None	TBS
138	0	64	None	TMFPRD_FP30_REG	leee64	None	TBS

3.3.2.1.2.1.29 Task General Register Set 1 Diagnostic Packet (TASK_MGR_GR1_DIAG)

The Task General Register Set 1 Diagnostic Packet is used to

- Name:** *TASK_MGR_GR1_DIAG*
- Application ID:** *757*
- Virtual Channel:** *9*
- Boot:** *True*
- Operational:** *True*
- Timeout (seconds):** *2*
- Packet Length:** *71*

Interface Definition 3-75 TASK_MGR_GR1_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	757	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	71	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8 9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30	Application packet sub-identifier. 1) Task 1 Diagnostics 2) Task 2 Diagnostics 3) Task 3 Diagnostics 4) Task 4 Diagnostics 5) Task 5 Diagnostics 6) Task 6 Diagnostics 7) Task 7 Diagnostics 8) Task 8 Diagnostics 9) Task 9 Diagnostics 10) Task 10 Diagnostics 11) Task 11 Diagnostics 12) Task 12 Diagnostics 13) Task 13 Diagnostics 14) Task 14 Diagnostics 15) Task 15 Diagnostics 16) Task 16 Diagnostics 17) Task 17 Diagnostics 18) Task 18 Diagnostics 19) Task 19 Diagnostics 20) Task 20 Diagnostics 21) Task 21 Diagnostics 22) Task 22 Diagnostics 23) Task 23 Diagnostics 24) Task 24 Diagnostics 25) Task 25 Diagnostics 26) Task 26 Diagnostics 27) Task 27 Diagnostics 28) Task 28 Diagnostics 29) Task 29 Diagnostics 30) Task 30 Diagnostics
10	0	32	None	TMGR1D_TID	UInt32	None	TBS
14	0	32	None	TMGR1D_LO	UInt32	None	TBS
18	0	32	None	TMGR1D_HI	UInt32	None	TBS
22	0	32	None	TMGR1D_V0_REG	UInt32	None	TBS
26	0	32	None	TMGR1D_V1_REG	UInt32	None	TBS
30	0	32	None	TMGR1D_A0_REG	UInt32	None	TBS

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
34	0	32	None	TMGR1D_A1_REG	UInt32	None	TBS
38	0	32	None	TMGR1D_A2_REG	UInt32	None	TBS
42	0	32	None	TMGR1D_A3_REG	UInt32	None	TBS
46	0	32	None	TMGR1D_T0_REG	UInt32	None	TBS
50	0	32	None	TMGR1D_T1_REG	UInt32	None	TBS
54	0	32	None	TMGR1D_T2_REG	UInt32	None	TBS
58	0	32	None	TMGR1D_T6_REG	UInt32	None	TBS
62	0	32	None	TMGR1D_T7_REG	UInt32	None	TBS
66	0	32	None	TMGR1D_T3_REG	UInt32	None	TBS
70	0	32	None	TMGR1D_T4_REG	UInt32	None	TBS
74	0	32	None	TMGR1D_T5_REG	UInt32	None	TBS

3.3.2.1.2.1.30 Task General Register Set 2 Diagnostic Packet (TASK_MGR_GR2_DIAG)

The Task General Register Set 2 Diagnostic Packet

Name: *TASK_MGR_GR2_DIAG*
Application ID: *758*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *71*

Interface Definition 3-76 TASK_MGR_GR2_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	758	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	71	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - TASK_1 2 - TASK_2 3 - TASK_3 4 - TASK_4 5 - TASK_5 6 - TASK_6 7 - TASK_7 8 - TASK_8	Application packet sub-identifier. 1) Task 1 Diagnostics 2) Task 2 Diagnostics 3) Task 3 Diagnostics 4) Task 4 Diagnostics 5) Task 5 Diagnostics 6) Task 6 Diagnostics 7) Task 7 Diagnostics

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						9 - TASK_9 10 - TASK_10 11 - TASK_11 12 - TASK_12 13 - TASK_13 14 - TASK_14 15 - TASK_15 16 - TASK_16 17 - TASK_17 18 - TASK_18 19 - TASK_19 20 - TASK_20 21 - TASK_21 22 - TASK_22 23 - TASK_23 24 - TASK_24 25 - TASK_25 26 - TASK_26 27 - TASK_27 28 - TASK_28 29 - TASK_29 30 - TASK_30	8) Task 8 Diagnostics 9) Task 9 Diagnostics 10) Task 10 Diagnostics 11) Task 11 Diagnostics 12) Task 12 Diagnostics 13) Task 13 Diagnostics 14) Task 14 Diagnostics 15) Task 15 Diagnostics 16) Task 16 Diagnostics 17) Task 17 Diagnostics 18) Task 18 Diagnostics 19) Task 19 Diagnostics 20) Task 20 Diagnostics 21) Task 21 Diagnostics 22) Task 22 Diagnostics 23) Task 23 Diagnostics 24) Task 24 Diagnostics 25) Task 25 Diagnostics 26) Task 26 Diagnostics 27) Task 27 Diagnostics 28) Task 28 Diagnostics 29) Task 29 Diagnostics 30) Task 30 Diagnostics
10	0	32	None	TMGR2D_TID	UInt32	None	TBS
14	0	32	None	TMGR2D_PC	UInt32	None	TBS
18	0	32	None	TMGR2D_S0_REG	UInt32	None	TBS
22	0	32	None	TMGR2D_S1_REG	UInt32	None	TBS
26	0	32	None	TMGR2D_S2_REG	UInt32	None	TBS
30	0	32	None	TMGR2D_S3_REG	UInt32	None	TBS
34	0	32	None	TMGR2D_S4_REG	UInt32	None	TBS
38	0	32	None	TMGR2D_S5_REG	UInt32	None	TBS
42	0	32	None	TMGR2D_S6_REG	UInt32	None	TBS
46	0	32	None	TMGR2D_S7_REG	UInt32	None	TBS
50	0	32	None	TMGR2D_S8_REG	UInt32	None	TBS
54	0	32	None	TMGR2D_T9_REG	UInt32	None	TBS
58	0	32	None	TMGR2D_GP_REG	UInt32	None	TBS
62	0	32	None	TMGR2D_SP_REG	UInt32	None	TBS
66	0	32	None	TMGR2D_T8_REG	UInt32	None	TBS
70	0	32	None	TMGR2D_FP_REG	UInt32	None	TBS
74	0	32	None	TMGR2D_RA_REG	UInt32	None	TBS

3.3.2.1.2.1.31 Task Summary Diagnostic Packet (TASK_SUMMARY_DIAG)

The Task Summary Diagnostic Packet provides an overview of tasks running on the FSC

Name: *TASK_SUMMARY_DIAG*
Application ID: 759
Virtual Channel: 9
Boot: True
Operational: True
Timeout (seconds): 2
Packet Length: 93

Interface Definition 3-77 TASK_SUMMARY_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	759	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	93	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	8	(30)	TSD_COMPONENT_ID	UInt8	None	Component ID for entry.
40	0	8	(30)	TSD_DIAG_PAGE	UInt8	None	Diagnostic page subid for other TASK_DIAG messages.
70	0	8	(30)	TSD_STATUS	UInt8	0 - READY 1 - SUSPEND 2 - PEND 3 - SUSP_BLOCK 4 - SLEEP 5 - SUSP_SLEEP 6 - BLOCK_TO 7 - SUSP_BLOCK_TO 8 - DEAD 255 - INVALID	Execution status of the task. 0) Ready 1) Suspend 2) Pending 3) Suspend/Block 4) Sleep 5) Suspend/Sleep 6) Block/Timeout 7) Suspend/Block/Timeout 8) Dead 255) Invalid

3.3.2.1.2.1.32 Timer API Absolute Diagnostic Packet (TIMER_API_ABS_DIAG)

The Absolute SW Timer Diagnostic Packet

Name: *TIMER_API_ABS_DIAG*
Application ID: 763

Virtual Channel: 9
Boot: True
Operational: True
Timeout (seconds): 30
Packet Length: 139

Interface Definition 3-78 TIMER_API_ABS_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	763	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	139	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	64	(10)	TAAD_EVENT_TIME	Time	None	Scheduled time for event.
90	0	32	(10)	TAAD_TID	UInt32	None	Task Id of task that scheduled event.
130	0	8	(10)	TAAD_EF	UInt8	TBD by Ray Caperoon 1/7/99	Event flag scheduled.
140	0	16	None	TAAD_NUM	UInt16	None	Number of absolute events scheduled.
142	0	16	(2)	TAAD_SPARE	UInt16	None	Reserved.

3.3.2.1.2.1.33 Timer API Relative Diagnostic Packet (TIMER_API_REL_DIAG)

The Timer Application Programmers Interface Relative Diagnostic Packet

Name: *TIMER_API_REL_DIAG*
Application ID: 764
Virtual Channel: 9
Boot: True
Operational: True
Timeout (seconds): 30
Packet Length: 131

Interface Definition 3-79 TIMER_API_REL_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	764	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	131	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - PAGE_1 2 - PAGE_2 3 - PAGE_3 4 - PAGE_4 5 - PAGE_5	Application packet sub-identifier. 1) Page one of diagnostic. 2) Page two of diagnostic. 3) Page three of diagnostic. 4) Page four of diagnostic. 5) Page five of diagnostic.
10	0	32	(9)	TARD_CURRENT_COUNT	UInt32	None	Current event count.
46	0	32	(9)	TARD_RELOAD_COUNT	UInt32	None	Event reload count.
82	0	32	(9)	TARD_TID	UInt32	None	Task Id of task that scheduled event.
118	0	8	(9)	TARD_EF	UInt8	TBD by Ray Caperoon 1/7/99	Event flag scheduled.
127	0	8	(9)	TARD_RELOAD	UInt8	0 - RELOAD 1 - SINGLE 255 - INVALID	Array of timer reload indicators. 0) Reload Timer 1) Single timer 255) Invalid
136	0	16	None	TARD_COUNT	UInt16	None	Number of relative timers scheduled.

3.3.2.1.2.1.34 Time Manager Diagnostic Packet (TIME_MGR_DIAG)

The Time Manager Diagnostic Packet

Name: *TIME_MGR_DIAG*
Application ID: *762*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *27*

Interface Definition 3-80 TIME_MGR_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	762	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	27	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	64	None	TMD_LAST_TIME_SET	Time	None	Value for last time set command.
18	0	64	None	TMD_LAST_TIME_ADJUST	Time	None	Value for last time adjust command.
26	0	32	None	TMD_CONTEXT_PTR	UInt32	None	Pointer to time manager context structure.
30	0	16	None	TMD_OBJ_VERSION	UInt16	None	Version of timekeeping object selected.
32	0	16	None	TMD_SPARE	UInt16	None	Reserved.

3.3.2.1.2.1.35 Telemetry Processing Task Diagnostic Packet (TLM_PROC_TASK_DIAG)

The Telemetry Processing Task Diagnostic Packet

Name: *TLM_PROC_TASK_DIAG*
Application ID: *766*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *55*

Interface Definition 3-81 TLM_PROC_TASK_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	766	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	55	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	TPTD_TOT_SAMS_PROC	UInt32	None	Total number of normal telemetry type SAMS processed. This number is cumulative. After max is reached, the number rolls over to zero.
14	0	32	None	TPTD_TOT_SCE_PROC	UInt32	None	Total number of SCE type SAMS processed. This number is cumulative. After max is reached, the number

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							rolls over to zero.
18	0	32	None	TPTD_TOT_SAM_RTCO_GEN	UInt32	None	Total number of normal telemetry RTCOs generated. This number is cumulative. After max is reached, the number rolls over to zero.
22	0	32	None	TPTD_TOT_SCE_RTCO_GEN	UInt32	None	Total number of SCE type RTCOs generated. This number is cumulative. After max is reached, the number rolls over to zero.
26	0	32	None	TPTD_TOT_TLM_PROC_VIS	UInt32	None	Total number of visits to the TlmProc task. This number is cumulative. After max is reached, the number rolls over to zero.
30	0	16	None	TPTD_TOT_SAM_DECOM_ERR	UInt16	None	Total number of decom errors for normal telemetry SAMs. This number is cumulative. After max is reached, the number rolls over to zero.
32	0	16	None	TPTD_TOT_SCE_DECOM_ERR	UInt16	None	Total number of decom errors for SCE telemetry SAMs. This number is cumulative. After max is reached, the number rolls over to zero.
34	0	16	None	TPTD_TOT_SAM_RTCO_DROP	UInt16	None	Total number of normal telemetry RTCOs dropped. This number is cumulative. After max is reached, the number rolls over to zero.
36	0	16	None	TPTD_TOT_SCE_RTCO_DROP	UInt16	None	Total number of SCE RTCOs dropped. This number is cumulative. After max is reached, the number rolls over to zero.
38	0	16	None	TPTD_NUM_SAMS_PEND	UInt16	None	Number of SAMs awaiting decom in the normal telemetry input queue.
40	0	16	None	TPTD_NUM_SCES_PEND	UInt16	None	Number of SAMs awaiting decom in the SCE input queue.
42	0	16	None	TPTD_IDLE_STATUS	UInt16	None	Current state of telemetry idle status flag. This flag is set by the RTE. One indicates telemetry processing is paused. Zero indicates telemetry processing is active.
44	0	16	None	TPTD_TOT_ALARMS	UInt16	None	Total number of alarms generated. This includes yellow low, yellow high, red low, and red high. This number is cumulative. After max is reached, the number rolls over to zero.
46	0	16	None	TPTD_TOT_YEL	UInt16	None	Total number of yellow high alarms generated. This number is cumulative. After max is reached, the number rolls over to zero.
48	0	16	None	TPTD_TOT_RED	UInt16	None	Total number of red high alarms generated. This number is cumulative. After max is reached, the number rolls over to zero.
50	0	16	None	TPTD_LAST_SAM_FRAM_ID	UInt16	None	SCL Frame Id of last normal telemetry SAM decomed.
52	0	16	None	TPTD_LAST_SCE_FRAM_ID	UInt16	None	SCL Frame Id of last SCE telemetry SAM decomed.
54	0	16	None	TPTD_LAST_SAM_RTCO_ID	UInt16	None	ResID of last RTCO produced by normal telemetry SAM.
56	0	16	None	TPTD_LAST_SCE_RTCO_ID	UInt16	None	ResID of last RTCO produced by SCE SAM.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
58	0	16	None	TPTD_LAST_YEL_RESID	UInt16	None	ResID of last yellow high/low alarm.
60	0	16	None	TPTD_LAST_RED_RESID	UInt16	None	ResID of last red high/low alarm.

3.3.2.1.2.1.36 Version Diagnostic Packet (VERSION_DIAG)

The Version Diagnostic Packet

Name: *VERSION_DIAG*
Application ID: *769*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *203*

Interface Definition 3-82 VERSION_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	769	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	203	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	1 - VERSION_DESCRIPTOR 2 - ARCH_DESCRIPTION 3 - CONFIG_DESCRIPTOR	Application packet sub-identifier. 1) Message describes the version number and build date of software. 2) Message describes the architecture options used to build the software. 3) Message describes the configurable build options used to build the software.
10	0	8	(200)	VD_STRING	UInt8	None	Version string. Contents defined by subid.

3.3.2.1.2.1.37 Watchdog API Diagnostic Packet (WDOG_API_DIAG)

The Watchdog Diagnostic Packet

Name: *WDOG_API_DIAG*
Application ID: *771*
Virtual Channel: *9*

Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *83*

Interface Definition 3-83 WDOG_API_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	771	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	83	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	(16)	WAD_CURRENT_WDOG_COUNT	UInt16	None	Current countdown value in ICM clock ticks.
42	0	16	(16)	WAD_MAX_WDOG_COUNT	UInt16	None	Reload value in ICM clock ticks.
74	0	8	(16)	WAD_COMPONENT	UInt8	None	Component id of monitored task.

3.3.2.1.2.1.38 Extended Diagnostics Results Diagnostic Packet (XDIAG_RESULTS_DIAG)

The Extended Diagnostics Results Diagnostic Packet is available in ops mode to see the results of the extended diagnostics run with the GO command.

Name: *XDIAG_RESULTS_DIAG*
Application ID: *773*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *35*

Interface Definition 3-84 XDIAG_RESULTS_DIAG

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	773	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	35	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
10	0	32	(2)	XRD_BMAP	UInt32	None	Bitmap of diagnostics run during GO command.
18	0	32	(2)	XRD_DONE	UInt32	None	Bitmap of diagnostics that completed during GO command.
26	0	32	(2)	XRD_FAIL	UInt32	None	Bitmap of diagnostics that failed during GO command.
34	0	32	(2)	XRD_ERR	UInt32	None	Bitmap of diagnostics that encountered errors during GO command.

3.3.2.1.2.2 FSW Bus Events

3.3.2.1.2.2.1 Attitude Quality Change (ADAC_ATTITUDE_VALID)

Spacecraft attitude was able to be determined.

Name: *ADAC_ATTITUDE_VALID*
Application ID: *681*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-85 ADAC_ATTITUDE_VALID

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	681	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	AAV_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME1	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.2 ADAC IMU Transision (ADAC_IMU_TRANSITION)

A commanded or autonomous IMU selection has taken place.

Name: *ADAC_IMU_TRANSITION*

Application ID: 682
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-86 ADAC_IMU_TRANSITION

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	682	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	2	None	AIT_PRIM_FROM	2BitUInt8	0 - No IMUs 1 - IMU A 2 - IMU B 3 - IMU C	The value the primary KF is transitioning from.
10	2	2	None	AIT_SEC_FROM	2BitUInt8	0 - No IMUs 1 - IMU A 2 - IMU B 3 - IMU C	The value the secondary KF is transitioning from.
10	4	2	None	AIT_PRIM_TO	2BitUInt8	0 - No IMUs 1 - IMU A 2 - IMU B 3 - IMU C	The value the primary KF is transitioning to.
10	6	2	None	AIT_SEC_TO	2BitUInt8	0 - No IMUs 1 - IMU A 2 - IMU B 3 - IMU C	The value the secondary KF is transitioning to.
11	0	1	None	AIT_COMMANDED	1BitUInt8	0 - Autonomous 1 - Commanded	Indicates if the transition was commanded or autonomous.
11	1	7	None	AIT_SPARE_1	7BitUInt8	None	Reserved.
12	0	8	None	AIT_SPARE_2	UInt8	None	Reserved.
13	0	32	None	EVENT_TIME60	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.3 IMU Data Unreasonable (ADAC_IMU_UNREAS)

IMU data has exceeded reasonability limits.

Name: ADAC_IMU_UNREAS
Application ID: 683
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-87 ADAC_IMU_UNREAS

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	683	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	32	None	AIU_VALUE	ieee32	None	Value associated with failed test.
14	0	8	None	AIU_TEST	UInt8	1 - Hardware Failure 2 - Summary Status Failure 3 - Num Samples 4 - Stuck Data 5 - Cross Check 6 - Primary Rate Check 7 - Secondary Rate Check 8 - Primary Accel. Check 9 - Secondary Accel. Check	IMU Reasonableness test that has failed.
15	0	8	None	AIU_IMU_ID	UInt8	Mask of IMU(s) that failed check. Mask of 0x01 is IMU A, mask of 0x02 is IMU B, mask of 0x04 is IMU C. Other bits are undefined.	None.
16	0	32	None	EVENT_TIME62	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.4 ADAC Rate Valid (ADAC_RATE_VALID)

Spacecraft rates have become valid.

Name: ADAC_RATE_VALID
Application ID: 684
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-88 ADAC_RATE_VALID

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	684	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	ARV_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME61	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.5 Star Tracker Solution Rejected (ADAC_STAR_TRK_REJECT)

Star Tracker update rejected.

Name: ADAC_STAR_TRK_REJECT
Application ID: 687
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-89 ADAC_STAR_TRK_REJECT

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	687	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	ASTR_ANGLE	IEEE32	None	Angular difference between Kalman filter and Star Tracker solution (radians)
14	0	8	(2)	ASTR_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME59	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.6 Star Tracker Image Accepted (ADAC_ST_IMAGE_ACCEPTED)

Star tracker image was processed and accepted.

Name: ADAC_ST_IMAGE_ACCEPTED
Application ID: 685
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-90 ADAC_ST_IMAGE_ACCEPTED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	685	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	ASIA_MEAN_SQ_ERROR	IEEE32	None	Mean Square Error Calculation.
14	0	1	None	ASIA_CAM_ID	1BitUInt8	0 - Camera A 1 - Camera B	Camera ID
14	1	6	None	ASIA_STARS_USED	6BitUInt8	None	Number of stars used.
14	7	1	None	ASIA_RESERVED	1BitUInt8	None	Reserved.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
15	0	8	None	ASIA_TRIANGLES_USED	UInt8	None	Number of triangles used.
16	0	32	None	EVENT_TIME2	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.7 Star Tracker Image Rejected (ADAC_ST_IMAGE_REJECTED)

Star tracker image processed but rejected.

Name: *ADAC_ST_IMAGE_REJECTED*
Application ID: **686**
Virtual Channel: **9**
Boot: *False*
Operational: *True*
Timeout (seconds): **0**
Packet Length: **13**

Interface Definition 3-91 ADAC_ST_IMAGE_REJECTED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	686	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	32	None	ASIR_MEAN_SQ_ERROR	IEEE32	None	Mean Square Error Calculation.
14	0	1	None	ASIR_CAM_ID	1BitUInt8	0 - Camera A 1 - Camera B	Camera ID
14	1	6	None	ASIR_STARS_USED	6BitUInt8	None	Number of stars used.
14	7	1	None	ASIR_RESERVED	1BitUInt8	None	Reserved.
15	0	8	None	ASIR_TRIANGLES_USED	UInt8	None	Number of triangles used.
16	0	32	None	EVENT_TIME40	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.8 Background Diagnostic Failure (BKGRND_DIAG_FAILURE)

A background diagnostic has failed.

Name: *BKGRND_DIAG_FAILURE*
Application ID: **665**

Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-92 BKGRND_DIAG_FAILURE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	665	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	BKG_ADDRESS	UInt32	None	Failure address.
14	0	8	None	BKG_DIAG_ID	UInt8	1 - DRAM Scrub failure. 2 - Object scrub failure. 3 - Checksum failure. 4 - SOH failure.	Diagnostic ID.
15	0	8	None	BKG_ERROR	UInt8	1 - DRAM scrub source addr failure 2 - DRAM scrub no progress 3 - Bad Checksum 4 - Bad Checksum Table Entry 5 - Bad Checksum Pointer	Diagnostic error.
16	0	32	None	EVENT_TIME39	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.9 Boot Diagnostic Failure (BOOT_DIAG_FAILURE)

A boot extended diagnostic has failed.

Name: *BOOT_DIAG_FAILURE*
Application ID: 600
Virtual Channel: 9
Boot: True
Operational: True

Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-93 BOOT_DIAG_FAILURE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	600	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(4)	BDF_DIAG_VALUE	UInt8	None	Data associated with failure.
14	0	8	None	BDF_DIAG_ID	UInt8	None	Diagnostic ID
15	0	8	None	BDF_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME38	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.10 Boot Code Up (BOOT_UP)

Indicates the boot code is up and ready. Also reports the results of non-destructive diagnostics code.

Name: *BOOT_UP*
Application ID: 601
Virtual Channel: 9
Boot: *True*
Operational: *True*
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-94 BOOT_UP

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	601	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	BU_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME37	LoRes	None	Event time in seconds (GPS Epoch).

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
					Time		

3.3.2.1.2.2.11 Auth Count Failure (CMD_AUTH_FAILURE)

The command acquired from the CDU contains an invalid authentication count.

Name: *CMD_AUTH_FAILURE*
Application ID: *677*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-95 CMD_AUTH_FAILURE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	677	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	CAF_EXP_AUTH_CNT	UInt16	None	Expected Auth Count
12	0	16	None	CAF_ACT_AUTH_CNT	UInt16	None	Actual auth count
14	0	8	None	CAF_MSGID	UInt8	None	Command Id of failed command
15	0	8	None	CAF_SUBID	UInt8	None	Command SubId of failed command
16	0	32	None	EVENT_TIME36	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.12 Command Failed Constraint Check (CMD_BAD_CONSTRAINT)

The command acquired from the CDU, a Stored Command Sequence, or the Intra ISC interface failed to pass all of the constraint checks.

Name: *CMD_BAD_CONSTRAINT*
Application ID: *603*
Virtual Channel: *9*
Boot: *True*

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Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-96 CMD_BAD_CONSTRAINT

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	603	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	8	None	CBC_DATA	UInt8	None	Data value.
11	0	8	None	CBC_TASK	UInt8	Task that has detected error.	See table 3.7, Component ID Table.
12	0	8	None	CBC_MSGID	UInt8	See Table 3-5, Command List by ID	Msgid of the bad command.
13	0	8	None	CBC_SUBID	UInt8	See Table 3-5, Command List by ID	Subid of bad command.
14	0	8	None	CBC_ROUTE_CODE	UInt8	See Table 3-4, Application Process ID Assignments	Route code of bad command.
15	0	4	None	CBC_REASON_CODE	4BitUInt8	0 - Bad Msgid 1 - Bad Subid 2 - Bad Route Code 3 - Bad Length 4 - Bad Checksum 5 - Cmd not allowed from CDU 6 - Cmd not allowed via Intra 7 - Cmd not allowed from SCS 8 - Cmd not allowed in boot 9 - Cmd MUST be only sent to 1 ISC at a time. 10 - Bad floating point format.	Reason Code for why the command failed constraint checks. Note, once 1 constraint check is detected bad, the command is failed & no more constraints are checked.
15	4	4	None	CBC_SOURCE_TYPE	4BitUInt8	0- CDU 1 - Intra ISC 2 - Stored Command Sequence 3 - Direct	Identifies which interface the command was acquired from.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						4 - Unknown	
16	0	32	None	EVENT_TIME35	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.13 Bad Command Disposition (CMD_BAD_DISPOSITION)

Indicates that a command passed format, authentication and constraint checks, but failed to execute successfully.

Name: *CMD_BAD_DISPOSITION*
Application ID: *604*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-97 CMD_BAD_DISPOSITION

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	604	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	CBD_STATUS_CODE	UInt8	0 - Success 1 - Failed 2 - Bad State 3 - Bad Parameter 4 - Unexpected Message 5 - Out of sequence block 6 - Authenticate Failure 7 - Timeout 8 - Internal Error 9 - Bad CDU Length 10 - Bad SAM Characteristics 11 - Bad Sync 12 - ISC Not Selected 13 - Bad Checksum	Uplink Status code of disposition. This code matches the CRESULT_D field defined in the Interface Definition 3-56, Forward Link Protocol Telemetry. See table 3-18 for a detailed explanation for this field.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						14 - CRC Failure 15 - Block Load Not Enabled	
11	0	8	None	CBD_ROUTE_CODE	UInt8	See Table 3-4, Application Process ID Assignments	Route code of dispositioned command.
12	0	8	None	CBD_SOURCE_TYPE	UInt8	16 - CDU 32 - Stored Command Sequence 64 - Intra ISC command	Source type of dispositioned command.
13	0	8	None	CBD_MSG_ID	UInt8	See Table 3-5 Command List by ID	Command ID of dispositioned command.
14	0	8	None	CBD_SUB_ID	UInt8	See Table 3-5 Command List by ID	Sub ID of dispositioned command.
15	0	8	None	CBD_SOURCE_ISC	UInt8	0xC0 - ISC A 0x30 - ISC B 0x0C - ISC C 0x03 - ISC D	Source ISC of dispositioned command.
16	0	32	None	EVENT_TIME34	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.14 Bad Command Format (CMD_BAD_FORMAT)

The command received from the CDU failed to pass basic data integrity checks.

Name: *CMD_BAD_FORMAT*
Application ID: *605*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-98 CMD_BAD_FORMAT

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	605	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	CBF_DATA	UInt32	None	TBS.
14	0	8	None	CBF_REASON_CODE	UInt8	9 - Bad CDU Data Length 11 - Bad Sync 13 - Bad Sum to 0 check 14 - CRC Failure	Bad Format Reason Code
15	0	8	None	CBF_SPARE	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME33	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.15 Bad Command Parameter (CMD_BAD_PARAMETER)

Indicates a command has failed due to a bad parameter value.

Name: *CMD_BAD_PARAMETER*
Application ID: *606*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-99 CMD_BAD_PARAMETER

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	606	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	CBP_MSGID	UInt8	See Table 3-5, Command List by ID	Message ID of offending command.
11	0	1	None	CBP_PARAMETER_DATA_TYPE	1BitUInt8	0 - integer (UInt32 or Int32) 1 - floating point (IEEE32)	Data type for parameter data
11	1	7	None	CBP_PARAMETER_ID	7BitUInt8	Reference the offending commands Command Interface Definition Table	Parameter number in error.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						in Section 3.4.6.1.	
12	0	8	(4)	CBP_PARAMETER_DATA	UInt8	None	Parameter data in error.
16	0	32	None	EVENT_TIME32	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.16 Command Log Full (CMD_LOG_FULL)

Command Log Full indicates the Command Log has stopped logging data because it will begin to overwrite previous data. Occurs only when Command Log is in "Stop on Full" mode.

Name: *CMD_LOG_FULL*
Application ID: *608*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-100 CMD_LOG_FULL

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	608	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	CMD_LOG_FULL_DATA_RES	UInt8	None	Reserved
16	0	32	None	EVENT_TIME49	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.17 Command Timeout (CMD_TIMEOUT)

The command system timed out while waiting for the command execution disposition.

Name: *CMD_TIMEOUT*
Application ID: *609*
Virtual Channel: *9*
Boot: *False*

Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-101 CMD_TIMEOUT

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	609	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	CT_MSGID	UInt8	See Table 3-5, Command List by ID	Message ID of command that has timed out.
11	0	8	None	CT_ROUTE_CODE	UInt8	See Table 3-4, Application Process ID Assignments	Route code of command that has timed out.
12	0	8	(4)	CT_WAIT_TIME	UInt8	None	Delta Timeout value of command in seconds.
16	0	32	None	EVENT_TIME48	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.18 Diagnostics Log Full (DIAG_LOG_FULL)

Indicates the Diagnostics Log has stopped logging data because it will begin to overwrite previous data. Occurs only when Diagnostics Log is in "Stop on Full" mode.

Name: *DIAG_LOG_FULL*
Application ID: *610*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-102 DIAG_LOG_FULL

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	610	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	DLF_SPARE	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME47	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.19 Event Flag Error Indication (EF_ERRNO_INDICATION)

An internal integration error has occurred in the event library.

Name: *EF_ERRNO_INDICATION*
Application ID: *611*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-103 EF_ERRNO_INDICATION

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	611	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	EEI_ERRNO	UInt32	0-0xffffffff	Error number.
14	0	8	None	EEI_EVENT	UInt8	None	Event ID
15	0	8	None	EEI_ERROR_TYPE	UInt8	0 - Set/semGive() failed 1 - Clear/semTake() failed 2 - Unblock/semFlush() failed	Error type
16	0	32	None	EVENT_TIME46	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.20 Event Flag Invalid Data (EF_INVALID_DATA)

Invalid data detected in event flag library.

Name: *EF_INVALID_DATA*
Application ID: *612*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-104 EF_INVALID_DATA

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	612	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	EID_DATA_ELEMENT	UInt8	None	Data element in error.
11	0	8	None	EID_ERROR_TYPE	UInt8	0 - Init/semCreate failed 1 - List Add Event Inavlid	Error type
12	0	8	(4)	EID_SPARE	UInt8	0	Reserved.
16	0	32	None	EVENT_TIME45	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.21 Event Log Full (EV_LOG_FULL)

Event Log Full indicates the Event Log has stopped logging data because it will begin to overwrite previous data. Occurs only when Event Log is in "Stop on Full" mode.

Name: *EV_LOG_FULL*
Application ID: *613*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-105 EV_LOG_FULL

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	613	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	EV_LOG_FULL_DATA_RES	UInt8	None	Reserved
16	0	32	None	EVENT_TIME44	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.22 Internal Flight Software Error (FLT_SOFTWARE_ERROR)

Indicates an internal flight software error has occurred. See section G.3 for flight software error codes.

Name: *FLT_SOFTWARE_ERROR*
Application ID: *614*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-106 FLT_SOFTWARE_ERROR

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	614	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	FSE_ERROR_CODE	UInt16	See Section G.3, Table G-3 Flight Software Error Codes	ICM or VxWorks error code
12	0	8	None	FSE_COMPONENT_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK	Component issuing error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
13	0	8	None	FSE_TASK_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API	Task issuing error. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
14	0	16	None	FSE_LINE_NUMBER	UInt16	None	Line number where error occurred.
16	0	32	None	EVENT_TIME43	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.23 ISR Panic (ISR_PANIC)

An ISR was un-clearable, and an attempt to mask that isr out was made.

Name: *ISR_PANIC*
Application ID: *615*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-107 ISR_PANIC

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	615	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	IP_ISR_ID	UInt8	None	Id of ISR
11	0	8	None	IP_INT_DEPTH	UInt8	None	Depth of interrupt context
12	0	8	None	IP_RETRY	UInt8	None	Number of attempts made to clear interrupt before panic.
13	0	8	(3)	IP_SPARE	UInt8	0	Reserved.
16	0	32	None	EVENT_TIME42	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.24 Spurious ISR (ISR_SPURIOUS)

An unexpected interrupt was handled.

Name: *ISR_SPURIOUS*
Application ID: *616*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-108 ISR_SPURIOUS

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	616	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	IS_ID	UInt8	0 - R3000_SPURIOUS 1 - FPU_SPURIOUS 2 - RHC3001_SPURIOUS 3 - USR_INT_0 32 - TIMER_3_EOC 33 - TIMER_2_EOC 34 - CDU_VIRQ 35 - CDUA_PKT_RCVD 36 - CDUB_PKT_RCVD	Id of interrupt
11	0	8	(5)	IS_SPARE	UInt8	0	Reserved.
16	0	32	None	EVENT_TIME41	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.25 Log Compression Complete (LOG_COMPRESSION_COMPLETE)

Log compression has completed successfully.

Name: *LOG_COMPRESSION_COMPLETE*
Application ID: *617*

Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-109 LOG_COMPRESSION_COMPLETE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	617	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	LCC_SIZE	UInt32	None	Number of bytes
14	0	16	None	LCC_RESERVED	UInt16	None	Reserverd
16	0	32	None	EVENT_TIME58	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.26 Log Compression Error (LOG_COMPRESSION_ERROR)

An error has occurred while compressing the log.

Name: LOG_COMPRESSION_ERROR
Application ID: 618
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-110 LOG_COMPRESSION_ERROR

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	618	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							0) Reserved
10	0	8	None	LCE_ERROR_CODE	UInt8	TBD.	Error code.
11	0	8	(5)	LCE_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME57	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.27 Log Empty (LOG_EMPTY)

Indicates a dump request was received for a log is empty.

Name: *LOG_EMPTY*
Application ID: *619*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-111 LOG_EMPTY

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	619	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	LE_ERROR	UInt8	1 - No records in log 2 - Records exist in log, but not in requested time range.	Error type
11	0	8	None	LE_LOG	UInt8	1 - Telemetry Log 2 - Event Log 3 - Command Log 4 - SCS Log 5 - Stdout Log 6 - Diagnostics Log	Log ID.
12	0	8	(4)	LE_SPARE	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME56	LoRes	None	Event time in seconds (GPS Epoch).

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
					Time		

3.3.2.1.2.2.28 Memory Abort (MEM_ABORT)

A Memory load or Object load has been aborted.

Name: *MEM_ABORT*
Application ID: *667*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-112 MEM_ABORT

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	667	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	MA_REASON_CODE	UInt8	1 - UPLINK_LOADABORT_OOSPKT 2 - UPLINK_LOADABORT_EXCBYTLEN 3 - UPLINK_LOADABORT_NOTLDCMD 4 - UPLINK_LOADABORT_CHKSUMFAIL 5 - UPLINK_LOADABORT_TIMEOUT	1) An out-of-sequence block load packet was detected 2) The expected byte count was exceeded for the given load 3) Received an ICS command while in block load mode 4) The memory load completed, but the memory checksum failed 5) A timeout occurred while waiting for a response from the memory manager task during a block load sequence
11	0	8	None	MA_MEM_TYPE	UInt8	1 - EEPROM Load 2 - RAM Load 203 - Object Load	Type of load

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						204 - Memory Load	
12	0	8	(4)	MA_DATA	UInt8	None	Data
16	0	32	None	EVENT_TIME55	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.29 Memory Load Done (MEM_LOAD_DONE)

A EEPROM or RAM memory load is complete. The memory checksum is included in the event data.

Name: *MEM_LOAD_DONE*
Application ID: 621
Virtual Channel: 9
Boot: True
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-113 MEM_LOAD_DONE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	621	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	MLD_ADDR	UInt32	See Table H-1 Memory Map	Start address of completed memory load.
14	0	16	None	MLD_CHECKSUM	UInt16	None	Checksum of completed memory load.
16	0	32	None	EVENT_TIME54	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.30 Unexpected Memory Block Load Enable (MEM_UNEXPECTED_BLE)

Received a Block Load Enable (MEM_BLE) command when already enabled for memory loading.

Name: *MEM_UNEXPECTED_BLE*
Application ID: 622

Virtual Channel: 9
Boot: True
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-114 MEM_UNEXPECTED_BLE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	622	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	MEM_UNEXPECTED_BLE_DATA_RE S	UInt8	None	Reserved
16	0	32	None	EVENT_TIME53	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.31 Bad Object Found (OBJ_BAD)

An object was found to be corrupted and set to the bad state by the object scrubber.

Name: OBJ_BAD
Application ID: 623
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-115 OBJ_BAD

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	623	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							0) Reserved
10	0	8	None	OB_OBJ_REASON	UInt8	None	TBS
11	0	8	None	OB_OBJ_ID	UInt8	See Table B-1 Object Summary	Object ID of bad object.
12	0	8	None	OB_OBJ_SLOT	UInt8	See Table B-1 Object Summary	Slot bad object is in.
13	0	8	None	OB_OBJ_STATE	UInt8	5 - Bad 6- Selected Bad	New state of object
14	0	8	(2)	OB_OBJ_SPARE	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME52	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.32 Illegal object state transition (OBJ_ILLEGAL_STATE)

Illegal object state transition requested.

Name: *OBJ_ILLEGAL_STATE*
Application ID: *624*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-116 OBJ_ILLEGAL_STATE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	624	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	8	None	OBJ_ID	UInt8	See Table B-1 Object Summary	Object ID of object
11	0	8	None	OBJ_SLOT	UInt8	See Table B-1 Object Summary	Object slot of object.
12	0	8	None	OBJ_ORIG_STATE	UInt8	0 - Clear 1 - Loading	Original state of object

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						2 - Dubious 3 - Ready 4 - Selected 5 - Bad 6 - SelectedBad	
13	0	8	None	OBJ_REQ_STAT	UInt8	0 - Clear 1 - Loading 2 - Dubious 3 - Ready 4 - Selected 5 - Bad 6 - SelectedBad	Requested state of object
14	0	16	None	OBJ_SPARE	UInt16	None	Reserved.
16	0	32	None	EVENT_TIME51	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.33 Object Load Failed (OBJ_LOAD_FAILED)

Object load has failed.

Name: *OBJ_LOAD_FAILED*
Application ID: *625*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-117 OBJ_LOAD_FAILED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	625	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	8	None	OLF_OBJ_ID	UInt8	See Table B-1 Object Summary	ID of object that has failed.
11	0	8	None	OLF_OBJ_SLOT	UInt8	See Table B-1 Object	Slot number that was being loaded.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						Summary	
12	0	8	None	OLF_REASON	UInt8	0 - checksum failure 1 - Load sequence failure 2 - sanity check failure 3 - abort message received 4 - non-enabled slot failure 5 - header invalid failure	Reason object load failed.
13	0	8	None	OLF_SPARE	UInt8	None	Reserved.
14	0	16	None	OLF_DATA	UInt16	None	Data to support failure reason.
16	0	32	None	EVENT_TIME50	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.34 Object Load Validated (OBJ_LOAD_VALIDATED)

Indicates object load has been validated.

Name: *OBJ_LOAD_VALIDATED*
Application ID: *626*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-118 OBJ_LOAD_VALIDATED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	626	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	8	None	OLV_OBJ_ID	UInt8	See Table B-1 Object Summary	ID of object that was validated.
11	0	8	None	OLV_OBJ_SLOT	UInt8	See Table B-1 Object Summary	Slot number that was loaded.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
12	0	8	(4)	OLV_RESERVED	UInt8	None	Reserved
16	0	32	None	EVENT_TIME31	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.35 Object Sanity Check Failure (OBJ_SANITY_FAILURE)

Object sanity check has failed.

Name: *OBJ_SANITY_FAILURE*
Application ID: *627*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-119 OBJ_SANITY_FAILURE

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	627	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	OSF_TOTAL_FAILURES	UInt8	None	Total number of sanity check failures.
11	0	8	(5)	OSF_SANITY_CHECK	UInt8	See Table B-2, Object Sanity Check Failure Table.	Array of particular sanity check failures. 0 does not represent a failure; indicates field not used.
16	0	32	None	EVENT_TIME30	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.36 Object Selected (OBJ_SELECTED)

Object has been successfully selected.

Name: *OBJ_SELECTED*
Application ID: *629*
Virtual Channel: *9*

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Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-120 OBJ_SELECTED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	629	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	OS_OBJ_VERSION	UInt16	1-65535	The version of the object that was selected.
12	0	8	None	OS_TASK_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_M ON 22 - NON_DESTRUCT_DIA GS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_IS R 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API	Task id that has selected the object. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONE NT	38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
13	0	8	None	OS_OBJ_ID	UInt8	See table B-1, Object Summary Table.	The object id that has been selected.
14	0	8	None	OS_OBJ_SLOT	UInt8	See table B-1, Object Summary Table.	The object slot that has been selected.
15	0	8	None	OS_OBJ_SPARE	UInt8	0	Reserved.
16	0	32	None	EVENT_TIME29	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.37 Object Selected Failed (OBJ_SELECT_FAILED)

Object has been successfully selected.

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Name: *OBJ_SELECT_FAILED*
Application ID: 628
Virtual Channel: 9
Boot: *False*
Operational: *True*
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-121 OBJ_SELECT_FAILED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	628	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	OSF_OBJ_VERSION	UInt16	1-65535.	The version of the object that was selected.
12	0	8	None	OSF_TASK_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_M ON 22 - NON_DESTRUCT_DIA GS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_IS R 26 - CLOCK_API	Task id that has selected the object. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONE NT	33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
13	0	8	None	OSF_OBJ_ID	UInt8	See table B-1, Object Summary Table.	The object id that has been selected.
14	0	8	None	OSF_OBJ_SLOT	UInt8	See table B-1, Object Summary Table.	The object slot that has been selected.
15	0	8	None	OSF_OBJ_REASON	UInt8	TBD.	Reason for failure. Reasons are TBD
16	0	32	None	EVENT_TIME28	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.38 Commanded Reboot (REBOOT_COMMANDED)

Set right before a reboot is commanded.

Name: *REBOOT_COMMANDED*
Application ID: *630*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-122 REBOOT_COMMANDED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	630	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	RC_TIME	IEEE32	None	Time of day of reboot. This is in the LoResTime time format.
14	0	8	None	RC_CODE	UInt8	1 - Commanded by ground 2 - Watchdog failure 3 - ISCID failure 4 - ADAC timer failure 5 - ADAC EXEC timer failure 6 - VxWorks Reboot (Exception in interrupt or Work Queue Panic)	Reason for reboot.
15	0	8	None	RC_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME27	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.39 No RLT Data (RLT_NO_DATA)

Indicates that there is no data for the return link data stream

Name: *RLT_NO_DATA*

Application ID: 631
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-123 RLT_NO_DATA

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	631	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	RND_ISC	UInt8	0xC0 - ISC A 0x30 - ISC B 0x0C - ISC C 0x03 - ISC D	ISC id of missing data packet.
11	0	8	None	RND_MSGID	UInt8	See Appendix F	MSGID of missing data packet.
12	0	8	None	RND_SUBID	UInt8	See Appendix F	SUBID of missin data packet.
13	0	8	(3)	RND_SPARE	UInt8	None	Reserved
16	0	32	None	EVENT_TIME26	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.40 Stale Data (RLT_STALE_DATA)

Indicates that there is stale data in the return link data stream

Name: RLT_STALE_DATA
Application ID: 632
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-124 RLT_STALE_DATA

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	632	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	RSD_ISC	UInt8	0xC0 - ISC A 0x30 - ISC B 0x0C - ISC C 0x03 - ISC D	ISC id of stale data packet.
11	0	8	None	RSD_MSGID	UInt8	See Appendix F	MSGID of stale data packet.
12	0	8	None	RSD_SUBID	UInt8	See Appendix F	SUBID of stale data packet.
13	0	8	(3)	RSD_SPARE	UInt8	None	Reserved
16	0	32	None	EVENT_TIME25	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.41 SAM Error Number Indication (SAM_ERRNO_INDICATION)

A VxWorks messaging call has failed.

Name: *SAM_ERRNO_INDICATION*
Application ID: *633*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-125 SAM_ERRNO_INDICATION

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	633	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	SEI_ERRNO	UInt32	None	Error Number

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
14	0	8	None	SEI_QID	UInt8	None	Queue Id associated with failure.
15	0	8	None	SEI_ERROR_TYPE	UInt8	0 - Unable to create queue. 1 - Send failure. 2 - Receive failure. 3 - Number of messages failure	Error indication.
16	0	32	None	EVENT_TIME11	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.42 SAM Invalid Data (SAM_INVALID_DATA)

A failure was detected in the messaging software.

Name: *SAM_INVALID_DATA*
Application ID: *644*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-126 SAM_INVALID_DATA

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	644	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	SID_TASK_ID	UInt32	None	Task Id
14	0	8	None	SID_DATA_ELEMENT	UInt8	None	Data element
15	0	8	None	SID_ERROR_TYPE	UInt8	0 - PUT NULL Pointer 1 - PUT Invalid Length 2 - PUT Invalid Destination 3 - PUT Invalid Internal Command 4 - GET Invalid Args	Error type.

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						5 - GET Invalid Length 6 - Unable to Checksum 7 - NUM_QUEUE invalid args 8 - INIT Unknown Size 9 - Unable to EF_Set()	
16	0	32	None	EVENT_TIME10	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.43 SCL Log Full (SCL_LOG_FULL)

Indicates the SCL Error Output Log has stopped logging data because it will begin to overwrite previous data. Occurs only when SCL Log is in "Stop on Full" mode.

Name: *SCL_LOG_FULL*
Application ID: *645*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-127 SCL_LOG_FULL

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	645	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	SCL_LOG_FULL_DATA_RES	UInt8	None	Reserved
16	0	32	None	EVENT_TIME9	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.44 SCS Application Alert (SCS_APP_ALERT)

A user issued an "alert" keyword in a stored command sequence.

Name: *SCS_APP_ALERT*
Application ID: *646*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-128 SCS_APP_ALERT

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	646	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	32	None	SSA_DATA	UInt32	None	Data supplied in alert.
14	0	1	None	SSA_DATA_TYPE	1BitUInt16	None	Data type of SSA_DATA.
14	1	15	None	SSA_ID	15BitUInt16	None	Id supplied in alert.
16	0	32	None	EVENT_TIME8	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.45 SCS Application Warning (SCS_APP_WARNING)

A user issued an "warning" keyword in a stored command sequence.

Name: *SCS_APP_WARNING*
Application ID: *647*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-129 SCS_APP_WARNING

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	647	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	SSW_DATA	UInt32	None	Data supplied in warning.
14	0	1	None	SSW_DATA_TYPE	1BitUInt16	None	Data type of SSW_DATA.
14	1	15	None	SSW_ID	15BitUInt16	None	Id supplied in warning.
16	0	32	None	EVENT_TIME7	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.46 SCS Error (SCS_ERROR)

Indicates SCS RTE mis-operation.

Name: *SCS_ERROR*

Application ID: *648*

Virtual Channel: *9*

Boot: *False*

Operational: *True*

Timeout (seconds): *0*

Packet Length: *13*

Interface Definition 3-130 SCS_ERROR

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	648	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	SE_CODE	UInt16	512 - invalid SAM sub id	SCS error code.
12	0	16	(2)	SE_DATA	UInt16	None	SCS error data.
16	0	32	None	EVENT_TIME6	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.47 Bus Error (SSPM_BUS_ERROR)

A V-Bus error has occurred.

Name: *SSPM_BUS_ERROR*
Application ID: *649*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-131 SSPM_BUS_ERROR

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	649	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	SVE_EPC	UInt32	None	Exception program counter.
14	0	8	None	SVE_ERROR_TYPE	UInt8	8 - M-Bus data read. 9 - M-Bus instruction read. 10 - M-Bus timeout. 23 - M-Bus write error.	Type of bus error.
15	0	8	None	SVE_SPARE	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME5	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.48 EDAC Error (SSPM_EDAC_ERROR)

An EDAC error has occurred.

Name: *SSPM_EDAC_ERROR*
Application ID: *650*
Virtual Channel: *9*
Boot: *False*
Operational: *True*

Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-132 SSPM_EDAC_ERROR

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	650	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES 0) Reserved	Application packet sub-identifier.
10	0	32	None	SEE_ADDRESS	UInt32	None	Address of EDAC error.
14	0	8	None	SEE_SYNDROME	UInt8	None	EDAC syndrome.
15	0	4	None	SEE_ERROR_CNT	4BitUInt8	None	EDAC error count.
15	4	4	None	SEE_ERROR_TYPE	4BitUInt8	1 - I-Bus Error 2 - D-Bus Error 4 - M-Bus Read 8 - M-Bus Write	Source of first EDAC error which was logged.
16	0	32	None	EVENT_TIME4	LoResTime	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.49 Spacecraft Command and Telemetry Up (STARTUP_CAT_UP)

Indicates that the command and telemetry system has been initialized.

Name: *STARTUP_CAT_UP*
Application ID: 651
Virtual Channel: 9
Boot: *False*
Operational: *True*
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-133 STARTUP_CAT_UP

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	651	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	SCU_TIME	ieee32	None	Time when CAT is up.
14	0	8	(2)	SCU_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME3	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.50 Spacecraft GNC Up (STARTUP_GNC_UP)

Indicates that the guidance & navigation control system has been initialized.

Name: *STARTUP_GNC_UP*

Application ID: *652*

Virtual Channel: *9*

Boot: *False*

Operational: *True*

Timeout (seconds): *0*

Packet Length: *13*

Interface Definition 3-134 STARTUP_GNC_UP

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	652	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	SGU_TIME	ieee32	None	Time when GNC is up.
14	0	8	(2)	SGU_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME24	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.51 Operating System Up (STARTUP_OS_UP)

Indicates that the operating system has been initialized.

Name: *STARTUP_OS_UP*
Application ID: *653*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-135 STARTUP_OS_UP

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	653	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	SOU_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME23	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.52 Spacecraft Resource Management Up (STARTUP_SRM_UP)

Indicates that the resource manager has been initialized.

Name: *STARTUP_SRM_UP*
Application ID: *654*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-136 STARTUP_SRM_UP

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	654	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	SSU_TIME	ieee32	None	Time when SRC is up.
14	0	8	(2)	SSU_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME22	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.53 STDou Log Full (STDOUT_LOG_FULL)

Indicates the STDOUT Log has stopped logging data because it will begin to overwrite previous data. Occurs only when STDOUT Log is in "Stop on Full" mode.

Name: *STDOUT_LOG_FULL*
Application ID: *655*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-137 STDOUT_LOG_FULL

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	655	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	SLF_SPARE	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME21	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.54 Task Control Event (TASK_CTL)

Indicates action was taken on a TASK_CTL message.

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Name: *TASK_CTL*
Application ID: *656*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-138 TASK_CTL

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	656	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	TC_OPERATION_ERRNO	UInt32	None	Error code on failure.
14	0	8	None	TC_OPERATION	UInt8	1 - Remove 2 - Add 3 - Suspend 4 - Resume	TASK_MGR operation .
15	0	8	None	TC_COMP_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API	Component ID of task operation was applied to. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
16	0	32	None	EVENT_TIME20	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.55 Task Deleted (TASK_DELETED)

Indicates a task has been deleted.

Name: *TASK_DELETED*
Application ID: *657*
Virtual Channel: *9*
Boot: *False*
Operational: *True*

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Timeout (seconds): 0
 Packet Length: 13

Interface Definition 3-139 TASK_DELETED

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	657	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	TD_TASK_ID	UInt32	none.	Task id of deleted component.
14	0	8	None	TD_COMPONENT_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API	ICM Component Id of deleted component. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
15	0	8	None	TD_SPARE	UInt8	0	Reserved.
16	0	32	None	EVENT_TIME19	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.56 Task Exception (TASK_EXCEPTION)

A task level exception has occurred. Details of this event are TBD.

Name: *TASK_EXCEPTION*
Application ID: *658*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-140 TASK_EXCEPTION

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	658	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	TSK_EXC_TASK	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP	Component ID of the offending task 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
11	0	8	None	TSK_EXC_REASON	UInt8	See MIPS cause register definition, Table 6-2 in MIPS RISC Architecture.	Exception Reason Code
12	0	8	(4)	TSK_EXEC_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME18	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.57 Task Reset (TASK_RESET)

Indicates that the commanded task has reset.

Name: *TASK_RESET*
Application ID: *659*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-141 TASK_RESET

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	659	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(4)	TR_RES_FOR_BOOT	UInt8	None	Reserved for boot. Do not add data in this location. TR_COMP_ID must be at byte

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							offset 4.
14	0	8	None	TR_COMP_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF	Component ID that reset. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
15	0	8	None	TR_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME17	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.58 Task Shutdown (TASK_SHUTDOWN)

Indicates that the commanded task has shutdown.

Name: *TASK_SHUTDOWN*
Application ID: *660*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-142 TASK_SHUTDOWN

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	660	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(4)	TSD_RES_FOR_BOOT	UInt8	None	Reserved for boot. Do not add data in this location. TR_COMP_ID must be at byte offset 4.
14	0	8	None	TSD_COMP_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK	Component ID that shutdown. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON 20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API	14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK 19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						57 - UNKNOWN_COMPONENT	57) UNKNOWN_COMPONENT
15	0	8	None	TSD_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME16	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.59 Task Startup (TASK_STARTUP)

Indicates task startup. This event will not be reported during initialization, only as a result of TASK_MGR/TASK_MGR_ADD command.

Name: *TASK_STARTUP*
Application ID: *661*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *0*
Packet Length: *13*

Interface Definition 3-143 TASK_STARTUP

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	661	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	TSU_RES_FOR_BOOT	UInt8	None	Reserved for boot. Do not add data in this location. TR_COMP_ID must be at byte offset 4.
11	0	8	None	TSU_COMP_ID	UInt8	9 - UNKNOWN_TASK 11 - COMPRESS_TASK 12 - MEM_MGR 13 - CMD_UPLINK_TASK 14 - CMD_PROC_TASK 15 - TLM_PROC_TASK 16 - TIME_MGR 17 - TASK_MGR 18 - BKGRND_DIAGS_TASK 19 - BOOT_MON	Component ID that started up. 9) UNKNOWN_TASK 11) COMPRESS_TASK 12) MEM_MGR 13) CMD_UPLINK_TASK 14) CMD_PROC_TASK 15) TLM_PROC_TASK 16) TIME_MGR 17) TASK_MGR 18) BKGRND_DIAGS_TASK

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						20 - REAL_TIME_OS 21 - EXTENDED_DIAGS_MON 22 - NON_DESTRUCT_DIAGS_MON 23 - TIME_ISR 24 - CDU_CMD_ISR 25 - XPNDR_TLM_HALF_ISR 26 - CLOCK_API 27 - LOG_API 28 - MEM_API 29 - CMD_LOG_API 30 - ISR_API 31 - EF_API 32 - ISC_CONFIG_API 33 - EVT_LOG_API 34 - RM_API 35 - MATH_API 36 - MUTEX_API 37 - SAM_CHAR_API 38 - MEMORY_READ_API 39 - MEM_DUMP_API 40 - WDOG_API 41 - TLM_LOG_API 42 - TIMER_API 43 - TASK_API 44 - MSG_API 45 - RLT_API 46 - RING_API 47 - OS_STARTUP 48 - OBJ_API 49 - SOFT_RESET_HWIF 50 - TIMER_HWIF 51 - FSWLIB_API 52 - RESET_HWIF 53 - DIAG_LOG_API 54 - SCL_LOG_API 55 - STDOUT_LOG_API 56 - COMPRESS_API 57 - UNKNOWN_COMPONENT	19) BOOT_MON 20) REAL_TIME_OS 21) EXTENDED_DIAGS_MON 22) NON_DESTRUCT_DIAGS_MON 23) TIME_ISR 24) CDU_CMD_ISR 25) XPNDR_TLM_HALF_ISR 26) CLOCK_API 27) LOG_API 28) MEM_API 29) CMD_LOG_API 30) ISR_API 31) EF_API 32) ISC_CONFIG_API 33) EVT_LOG_API 34) RM_API 35) MATH_API 36) MUTEX_API 37) SAM_CHAR_API 38) MEMORY_READ_API 39) MEM_DUMP_API 40) WDOG_API 41) TLM_LOG_API 42) TIMER_API 43) TASK_API 44) MSG_API 45) RLT_API 46) RING_API 47) OS_STARTUP 48) OBJ_API 49) SOFT_RESET_HWIF 50) TIMER_HWIF 51) FSWLIB_API 52) RESET_HWIF 53) DIAG_LOG_API 54) SCL_LOG_API 55) STDOUT_LOG_API 56) COMPRESS_API 57) UNKNOWN_COMPONENT
12	0	8	(4)	TSU_RESERVED	UInt8	None	Reserved.
16	0	32	None	EVENT_TIME15	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.60 Telemetry Log Full (TLM_LOG_FULL)

Indicates the Telemetry Log has stopped logging data because it will begin to overwrite previous data. Occurs only when Telemetry Log is in "Stop on Full" mode.

Name: *TLM_LOG_FULL*
Application ID: 662
Virtual Channel: 9
Boot: *False*
Operational: *True*
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-144 TLM_LOG_FULL

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	662	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	(6)	TLM_LOG_FULL_DATA_RES	UInt8	None	Reserved
16	0	32	None	EVENT_TIME14	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.61 Telemetry Out Of Limits Red (TLM_OUT_OF_LIMITS_RED)

Telemetry out of red limits detected by telemetry processing.

Name: *TLM_OUT_OF_LIMITS_RED*
Application ID: 663
Virtual Channel: 9
Boot: *False*
Operational: *True*
Timeout (seconds): 0
Packet Length: 13

Interface Definition 3-145 TLM_OUT_OF_LIMITS_RED

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	663	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	TOOLR_RES_ID	UInt16	None	Resource ID of telemetry item.
12	0	8	(4)	TOOLR_RAW_VALUE	UInt8	None	Raw value detected
16	0	32	None	EVENT_TIME13	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.2.62 Telemetry Out Of Limits Yellow (TLM_OUT_OF_LIMITS_YELLOW)

Telemetry out of yellow limits detected by telemetry processing.

Name: *TLM_OUT_OF_LIMITS_YELLOW*
Application ID: **664**
Virtual Channel: **9**
Boot: *False*
Operational: *True*
Timeout (seconds): **0**
Packet Length: **13**

Interface Definition 3-146 TLM_OUT_OF_LIMITS_YELLOW

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	664	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	13	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	TOOLY_RES_ID	UInt16	None	Resource ID of telemetry item.
12	0	8	(4)	TOOLY_RAW_VALUE	UInt8	None	Raw value detected
16	0	32	None	EVENT_TIME12	LoRes Time	None	Event time in seconds (GPS Epoch).

3.3.2.1.2.3 FSW Bus State Of Health

3.3.2.1.2.3.1 Attitude Determination And Control Task State of Health Packet (ADAC_TASK_SOH)

The Attitude Determination And Control Task State of Health Packet is used for TBS.

Name: ADAC_TASK_SOH
Application ID: 279
Virtual Channel: 9
Boot: False
Operational: True
Timeout (seconds): 30
Packet Length: 95

Interface Definition 3-147 ADAC_TASK_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	279	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	95	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	(3)(2)	ATS_KALMAN_QUAT	Int16	None	A 3-element quaternion for each Kalman filter. Outer Index 0 is primary Kalman filter, Index 1 is secondary Kalman filter.
22	0	16	(3)(2)	ATS_IMU_BODY_RATES	Int16	None	IMU body rates: X,Y, Z after rate filter. Scaled from -10°/sec to +10°/sec.
34	0	16	(3)(2)	ATS_KALMAN_DRIFT_RATE	Int16	None	Kalman filter drift rates: X, Y, Z. Scaled from +1.6E-4 rad/sec to -1.6E-4 rad/sec. Outer index 0 is primary KF, Outer index 1 is secondary KF.
46	0	8	(2)	ATS_NUM_IMU_FAILURES	UInt8	0 -255	Number of IMU failures: index 0 is Primary IMU, index 1 is Secondary IMU.
48	0	16	(2)	ATS_IMU_BIT	UInt16	0 - 0xFFFF	Last IMU Built in test word. Index 0 is primary IMU, index 1 is secondary IMU.
52	0	16	None	ATS_SPARE_3	UInt16	None	Reserved.
54	0	32	(3)(2)	ATS_KF_COVARIANCE	IEEE32	None	Kalman filter covariance. Outer index 0 is covariance for primary KF. Outer index 1 is covariance for secondary KF.
78	0	2	None	ATS_IMU_KFA_CONNECT	2BitUInt8	0 - IMU A 1 - IMU B 2 - IMU C 3 - none	IMU connected to primary KF.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
78	2	2	None	ATS_IMU_KFB_CONNECT	2BitUInt8	0 - IMU A 1 - IMU B 2 - IMU C 3 - none	IMU connected to secondary KF.
78	4	4	None	ATS_OVERRUN	4BitUInt8	0 - 15	ADAC Task overrun counter.
79	0	8	(2)	ATS_STC_REJECT	UInt8	0- 255	Count of star tracker images rejected by each Kalman Filter. Index 0 is primary KF, index 1 is secondary KF.
81	0	1	None	ATS_SPARE	1BitUInt8	None	Reserved.
81	1	1	None	ATS_PRIMARY_KF_BYPASS	1BitUInt8	0 - indicates output attitude is from primary KF 1 - indicates output attitude is from Bypass Filter	Primary Kalman Filter Bypass indicator.
81	2	1	None	ATS_KFA_ATT_VALID	1BitUInt8	0 - is invalid 1 - is valid	Indicates whether primary KF is producing valid attitude.
81	3	1	None	ATS_KFB_ATT_VALID	1BitUInt8	0 - is invalid 1 - is valid	Indicates whether secondary KF is producing valid attitude.
81	4	1	None	ATS_KFA_RATE_VALID	1BitUInt8	0 - is invalid 1 - is valid	Indicates whether primary KF is producing valid rates.
81	5	1	None	ATS_KFB_RATE_VALID	1BitUInt8	0 - is invalid 1 - is valid	Indicates whether secondary KF is producing valid rates.
81	6	2	None	ATS_THRUSTER_FIRE_STATU S	2BitUInt8	0 - Active 1 - Inactive 2 - Abort 3 - Reserved.	CMG Thruster firing status.
82	0	16	(3)	ATS_BYPASS_QUAT	Int16	None	A 3-element quaternion for filter bypass attitude estimate.
88	0	16	(3)	ATS_DELTA_H_REMAIN	Int16	None	Remaining delta H for each axis. Units are TBD.
94	0	8	(3)	ATS_APPROACH_RATE	UInt8	None	Shuttle approach rate indicator; X, Y & Z.
97	0	8	None	ATS_APPROACH_ERROR_ANG LE	UInt8	None	Shuttle approach error angle indicator.
98	0	1	None	ATS_BYPASS_ATT_VALID	1BitUInt16	0 - Bypass Attitude Invalid 1 - Bypass Attitude Valid	Indicates if the bypass filter has valid attitude.
98	1	15	None	ATS_SPARE_1	15BitUInt16	None	Reserved.
100	0	16	None	ATS_SPARE_2	UInt16	None	Reserved.

3.3.2.1.2.3.2 Background Diagnostic Task State of Health Packet (BKGRND_DIAGS_TASK_SOH)

The Background Diagnostic Task State of Health Packet

Name: *BKGRND_DIAGS_TASK_SOH*
Application ID: *275*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *19*

Interface Definition 3-148 BKGRND_DIAGS_TASK_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	275	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	19	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	BDTS_ITER	UInt32	None	Number of iterations.
14	0	32	None	BDTS_FAILURES	UInt32	None	Number of diagnostic failures.
18	0	32	None	BDTS_SCRUB_ADDR	UInt32	None	Current memory scrub address.
22	0	7	None	BDTS_CPU_TIME	7BitUInt32	0-100 or 111	Percentage of CPU time being used by background diags. Set to 111 if the CPU time is not being calculated.
22	7	25	None	BDTS_SPARE	25BitUInt32	None	Reserved.

3.3.2.1.2.3.3 Boot Telemetry Table State of Health Packet (BTT_SOH)

TBS

Name: *BTT_SOH*
Application ID: *273*
Virtual Channel: *9*
Boot: *True*
Operational: *False*
Timeout (seconds): *30*
Packet Length: *19*

Interface Definition 3-149 BTT_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	273	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	19	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	32	None	BTT_NUM_PUTS	UInt32	None	TBS
14	0	32	None	BTT_NUM_GETS	UInt32	None	TBS
18	0	32	None	BTT_NUM_PUT_ERRS	UInt32	None	TBS
22	0	32	None	BTT_NUM_GET_ERRS	UInt32	None	TBS

3.3.2.1.2.3.4 Command Processing Task State Of Health Packet (CMD_PROC_TASK_SOH)

The Command Processing Task State Of Health Packet

Name: *CMD_PROC_TASK_SOH*
Application ID: *214*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *17*

Interface Definition 3-150 CMD_PROC_TASK_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	214	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	17	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	8	None	CPTS_NUM_PENDING_SCRIPTS	UInt8	None	A count of the total number of scripts currently scheduled will be maintained. This count will include scripts that are waiting and scripts that are actually executing. It will not include scripts that have completed, terminated, or have exited. In the case there are 255 or more pending scripts, this item will read 255.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
11	0	8	None	CPTS_NUM_EXEC_SCRIPTS	UInt8	None	A count of the total number of scripts currently executing in the RTE will be maintained. It will include script threads that are waiting for disposition. This count will not include script threads that are in a wait state or suspended state. It will not include scripts that are pending on the scheduler. It will not include scripts that have completed, exited, or terminated. In the case there are 255 or more executing scripts, this item will read 255.
12	0	16	None	CPTS_TOTAL_RTE_ERRS	UInt16	None	Total number of errors. This count includes malloc errors, bad disposition errors, disposition time-outs, and RTE errors logged to SclErrorLog. This count will roll-over to zero after 65536 is reached. This count is reset after START RTE issued.
14	0	16	None	CPTS_TOTAL_OBJ_LOAD	UInt16	None	Total number of objects loaded to RTE. This includes scripts, rules, and database elements. This count will roll-over to zero after 65536 is reached. This count is reset after START RTE issued.
16	0	16	None	CPTS_TOTAL_SCRIPT_SCHEDULE	UInt16	None	Total number of scripts that were scheduled. This count will roll-over to zero after 65536 is reached. This count is reset after START RTE issued.
18	0	16	None	CPTS_TOTAL_RULES FIRED	UInt16	None	Total number of rules that fired since startup. This count will roll-over to zero after 65536 is reached. The count is reset after START RTE issued.
20	0	16	None	CPTS_TOTAL_RTE_CYCLES	UInt16	None	Total number of RTE round-robin cycles. This count will roll-over to zero after 65536 is reached. The count is reset after start RTE command issued. A round-robin cycle includes servicing real-time command queue, RTCO queues, script scheduler, and rule agenda processing.
22	0	2	None	CPTS_RTE_STATE	2BitUInt16	0 - DOWN 1 - RUNNING 2 - PAUSED 3 - STOPPED	The current state of the SCS RTE. 0) Down 1) Running 2) Paused 3) Stopped
22	2	14	None	CPTS_SPARE	14BitUInt16	None	Reserved.

3.3.2.1.2.3.5 Command Uplink Task State Of Health Packet (CMD_UPLINK_TASK_SOH)

The Command Uplink Task State Of Health Packet

Name: *CMD_UPLINK_TASK_SOH*
Application ID: *219*
Virtual Channel: *9*

Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *11*

Interface Definition 3-151 CMD_UPLINK_TASK_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	219	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	11	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	CUTS_CRIT_CMD_CNT	UInt16	None	The number of Critical commands received from the ground in a CTF format.
12	0	16	None	CUTS_FWL_CMD_RCV_CNT	UInt16	None	Number of commands detected on the forward link
14	0	8	None	CUTS_SCS_ACCEPT_CNT	UInt8	None	Number of commands successfully processed from the Stored Command Sequence interface.
15	0	8	None	CUTS_SCS_REJECT_CNT	UInt8	None	Number of commands processed from the Stored Command Sequence interface that failed.
16	0	8	None	CUTS_INTRA_ACCEPT_CNT	UInt8	None	Number of commands successfully processed via the Intra ISC command interface.
17	0	8	None	CUTS_INTRA_REJECT_CNT	UInt8	None	Number of commands processed from the Intra ISC command interface that failed.

3.3.2.1.2.3.6 Event Log API State Of Health Packet (EVT_LOG_API_SOH)

The Event Log Application Programmers Interface State of Health Packet

Name: *EVT_LOG_API_SOH*
Application ID: *294*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *11*

Interface Definition 3-152 EVT_LOG_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	294	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	11	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	ELAS_EVENT_COUNT	UInt16	None	Number of events reported. Will wrap around from 65535 to zero.
12	0	16	None	ELAS_LOST_EVENT_COUNT	UInt16	None	Number of events lost in downlink queue. Will wrap around from 65535 to zero.
14	0	16	None	ELAS_LOST_EVENT_LOG_COUNT	UInt16	None	Number of events lost from the event log. Will wrap around from 65535 to zero.
16	0	8	None	ELAS_LOST_RECUR_EVT CNT	UInt8	None	Number of events lost due to recursive event report function calls. Will wrap around from 255 to zero.
17	0	8	None	ELAS_SPARE	UInt8	None	Reserved.

3.3.2.1.2.3.7 Interrupt Service Routine API State Of Health Packet (ISR_API_SOH)

The Interrupt Service Routine Application Programmers Interface State of Health Packet

Name: *ISR_API_SOH*
Application ID: *202*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *5*

Interface Definition 3-153 ISR_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	202	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	8	None	IAS_PANIC	UInt8	None	Number of interrupt panics detected.
11	0	4	None	IAS_INT_NEST_WATERMARK	4BitUInt8	None	High watermark for interrupt nesting.
11	4	4	None	IAS_SPARE	4BitUInt8	None	Reserved.

3.3.2.1.2.3.8 Log State Of Health Packet (LOG_SOH)

The Log State of Health Packet

Name: *LOG_SOH*
Application ID: *205*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *15*

Interface Definition 3-154 LOG_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	205	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	15	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	8	None	LS_TLM_PERCENT_FULL	UInt8	0 - 100	Telemetry Log percent full.
11	0	8	None	LS_EVT_PERCENT_FULL	UInt8	0 - 100	Event Log percent full.
12	0	8	None	LS_CMD_PERCENT_FULL	UInt8	0 - SOF 1 - WRAPPED	Command Log percent full. 0) Not Wrapped / SOF 1) Wrapped
13	0	8	None	LS_SCL_PERCENT_FULL	UInt8	0 - 100	SCL Error Output Log percent full.
14	0	8	None	LS_STDOUT_PERCENT_FULL	UInt8	0 - 100	STDOUT Log percent full.
15	0	8	None	LS_DIAG_PERCENT_FULL	UInt8	0 - 100	Diagnostics Log percent full.
16	0	3	None	LS_TLM_LOG_STATE	3BitUInt8	0 - UNKNOWN 1 - STOP 2 - RUN 3 - DUMP	State of telemetry log 0) Unknown 1) Stopped 2) Running

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						4 - PREVIOUS 7 - INVALID	3) Dumping 4) Previous 7) Invalid
16	3	1	None	LS_TLM_LOG_BEHAVIOR	1BitUInt8	0 - OVERWRITE 1 - STOP	Telemetry log full behavior 0) Overwrite on full 1) Stop on full
16	4	8	None	LS_EVT_LOG_STATE	UInt8	0 - UNKNOWN 1 - STOP 2 - RUN 3 - DUMP 4 - PREVIOUS 7 - INVALID	State of event log 0) Unknown 1) Stopped 2) Running 3) Dumping 4) Previous 7) Invalid
17	4	1	None	LS_EVT_LOG_BEHAVIOR	1BitUInt8	0 - OVERWRITE 1 - STOP	Event log full behavior 0) Overwrite On full 1) Stop on full
17	5	3	None	LS_CMD_LOG_STATE	3BitUInt8	0 - UNKNOWN 1 - STOP 2 - RUN 3 - DUMP 4 - PREVIOUS 7 - INVALID	State of command log 0) Unknown 1) Stopped 2) Running 3) Dumping 4) Previous 7) Invalid
18	0	1	None	LS_CMD_LOG_BEHAVIOR	1BitUInt8	0 - OVERWRITE 1 - STOP	Command log full behavior 0) Overwrite On full 1) Stop on full
18	1	3	None	LS_SCL_LOG_STATE	3BitUInt8	0 - UNKNOWN 1 - STOP 2 - RUN 3 - DUMP 4 - PREVIOUS 7 - INVALID	State of SCL error output log 0) Unknown 1) Stopped 2) Running 3) Dumping 4) Previous 7) Invalid
18	4	1	None	LS_SCL_LOG_BEHAVIOR	1BitUInt8	0 - OVERWRITE 1 - STOP	SCL error output log full behavior 0) Overwrite On full 1) Stop on full
18	5	3	None	LS_STDOUT_LOG_STATE	3BitUInt8	0 - UNKNOWN 1 - STOP 2 - RUN 3 - DUMP 4 - PREVIOUS 7 - INVALID	State of stdout log 0) Unknown 1) Stopped 2) Running 3) Dumping 4) Previous

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
							7) Invalid
19	0	1	None	LS_STDOUT_LOG_BEHAVIOR	1BitUInt8	0 - OVERWRITE 1 - STOP	Stdout log full behavior 0) Overwrite On full 1) Stop on full
19	1	3	None	LS_DIAG_LOG_STATE	3BitUInt8	0 - UNKNOWN 1 - STOP 2 - RUN 3 - DUMP 4 - PREVIOUS 7 - INVALID	State of diagnostics log 0) Unknown 1) Stopped 2) Running 3) Dumping 4) Previous 7) Invalid
19	4	1	None	LS_DIAG_LOG_BEHAVIOR	1BitUInt8	0 - OVERWRITE 1 - STOP	Diagnostics log full behavior 0) Overwrite On full 1) Stop on full
19	5	2	None	LS_EVT_MODE	2BitUInt8	0 - EMPTY 1 - FULL 2 - NORMAL 3 - INVALID	Event log mode. 0) Event Log Empty 1) Event Log Full 2) Event Log Normal 3) Invalid
19	7	2	None	LS_TLM_MODE	2BitUInt8	0 - EMPTY 1 - FULL 2 - NORMAL 3 - INVALID	Telemetry log mode. 0) Telemetry Log Empty 1) Telemetry Log Full 2) Telemetry Log Normal 3) Invalid
20	1	2	None	LS_CMD_MODE	2BitUInt8	0 - EMPTY 1 - FULL 2 - NORMAL 3 - INVALID	Command log mode. 0) Command Log Empty 1) Command Log Full 2) Command Log Normal 3) Invalid
20	3	2	None	LS_STDOUT_MODE	2BitUInt8	0 - EMPTY 1 - FULL 2 - NORMAL 3 - INVALID	Standard Out log mode. 0) Stdout Log Empty 1) Stdout Log Full 2) Stdout Log Normal 3) Invalid
20	5	2	None	LS_SCL_MODE	2BitUInt8	0 - EMPTY 1 - FULL 2 - NORMAL 3 - INVALID	SCL log mode. 0) SCL Log Empty 1) SCL Log Full 2) SCL Log Normal 3) Invalid
20	7	2	None	LS_DIAG_MODE	2BitUInt8	0 - EMPTY 1 - FULL 2 - NORMAL	Diagnostic log mode. 0) Diagnostic Log Empty 1) Diagnostic Log Full

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						3 - INVALID	2) Diagnostic Log Normal 3) Invalid
21	1	1	None	LS_EVT_WRAP	1BitUInt8	0 - SOF 1 - WRAPPED	Indicates if event log has wrapped in overwrite-on-full mode. 0) Not Wrapped / SOF 1) Wrapped
21	2	1	None	LS_TLM_WRAP	1BitUInt8	0 - SOF 1 - WRAPPED	Indicates if telemetry log has wrapped in overwrite-on-full mode. 0) Not Wrapped / SOF 1) Wrapped
21	3	1	None	LS_CMD_WRAP	1BitUInt8	0 - SOF 1 - WRAPPED	Indicates if command log has wrapped in overwrite-on-full mode. 0) Not Wrapped / SOF 1) Wrapped
21	4	1	None	LS_STDOUT_WRAP	1BitUInt8	0 - SOF 1 - WRAPPED	Indicates if standard out log has wrapped in overwrite-on-full mode. 0) Not Wrapped / SOF 1) Wrapped
21	5	1	None	LS_SCL_WRAP	1BitUInt8	0 - SOF 1 - WRAPPED	Indicates if SCL log has wrapped in overwrite-on-full mode. 0) Not Wrapped / SOF 1) Wrapped
21	6	1	None	LS_DIAG_WRAP	1BitUInt8	0 - SOF 1 - WRAPPED	Indicates if diagnostics log has wrapped in overwrite-on-full mode. 0) Not Wrapped / SOF 1) Wrapped
21	7	6	None	LS_SPARE2	6BitUInt8	None	Reserved.

3.3.2.1.2.3.9 Memory Dump Packet (MEMORY_DUMP)

The Memory Dump Packet is used to download bytes of RAM, EEPROM, Objects, Logs, and SCS Resources

Name: *MEMORY_DUMP*
Application ID: *1001*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *1079*

Interface Definition 3-155 MEMORY_DUMP

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	1001	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	1079	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	MD_DUMP_TYPE	UInt16	1 - MEMORY 2 - LOG 3 - OBJECT 4 - SCS	Type of dump being downlinked. 1) RAM, EEPROM, Compressed RAM, or Compressed EEPROM 2) Log 3) Object (aka Parameter block 4) Stored Command Sequence
12	0	16	None	MD_DUMP_SUBTYPE	UInt16	If dumpType = 1 (memory) then subtype indicates EEPROM, RAM, compressed EEPROM, or compressed RAM. If dumpType = 2 (log), subtype is log id. If dumpType=3 (object), then MSB of subtype is object id and LSB is object slot. If dumpType=4 (SCL), then subtype is TBD	Subtype of the dump type being downlinked.
14	0	32	None	MD_START_ADDR	UInt32	None	Start address for address oriented memory. Cast to leee32 to get start time for log dumps.
18	0	32	None	MD_LENGTH	UInt32	None	Number of bytes for address oriented memory. Cast to leee32 to get end time for log dumps.
22	0	32	None	MD_CURRENT_ADDR	UInt32	None	Current address being downlinked in this packet.
26	0	16	None	MD_CHECKSUM	UInt16	None	Checksum for entire memory being downlinked.
28	0	8	None	MD_NUM_COPIES	UInt8	None	Number of copies to be downlinked.
29	0	8	None	MD_CURRENT_COPY	UInt8	None	Current copy being downlinked in this packet.
30	0	8	(1056)	MD_BYTES	UInt8	None	Bytes of the memory being downlinked. This is variable up to the listed maximum size.

3.3.2.1.2.3.10 Memory API State Of Health Packet (MEM_API_SOH)

The Memory Application Programmers Interface State of Health Packet

Name: *MEM_API_SOH*
Application ID: *208*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *5*

Interface Definition 3-156 MEM_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	208	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	8	None	MES_TOT_NUM_ERRORS	UInt8	None	Total number of errors from MEM_API.
11	0	1	None	MES_EDAC_DISABLED	1BitUInt8	0 - NOT_DISABLED 1 - DISABLED	Flag stating if EDAC has been disabled. EDAC is only disabled while EEPROM is being written to. 0) Not Disabled 1) Disabled
11	1	7	None	MES_SPARE	7BitUInt8	None	Reserved.

3.3.2.1.2.3.11 Memory Dump API State Of Health Packet (MEM_DUMP_API_SOH)

The Memory Dump Application Programmers Interface State of Health Packet

Name: *MEM_DUMP_API_SOH*
Application ID: *210*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *23*

Interface Definition 3-157 MEM_DUMP_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	210	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	23	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	MDAS_DUMP_START_ADDR	UInt32	None	Current Dump Start Address
14	0	32	None	MDAS_DUMP_END_ADDR	UInt32	None	Current Dump End Address
18	0	32	None	MDAS_DUMP_OFFSET	UInt32	None	Current Dump Offset
22	0	32	None	MDAS_CURR_DUMP_ADDR	UInt32	None	Current Dump Address
26	0	16	None	MDAS_CHECKSUM	UInt16	0 - 0xFFFF	Current Dump Checksum
28	0	16	None	MDAS_DUMP_SUBTYPE	UInt16	TBS	Current dump subtype
30	0	8	None	MDAS_NUM_COPIES	UInt8	1-255 Use 0 for continuous.	Number of copies for current dump.
31	0	8	None	MDAS_CURRENT_COPY	UInt8	None	Current dump copy.
32	0	8	None	MDAS_DUMP_TYPE	UInt8	1 - MEMORY 2 - LOG 3 - OBJECT 4 - SCS	Identifies the current dump type. 1) Memory Range (EEPROM or RAM) 2) Log 3) Parameter Table Object 4) Stored Command Sequence
33	0	1	None	MDAS_DUMP_ACTIVE	1BitUInt8	0 - NOT_ACTIVE 1 - ACTIVE	Indicates whether a dump is currently active. 0) Not Active 1) Active
33	1	7	None	MDAS_SPARE	7BitUInt8	None	Reserved.

3.3.2.1.2.3.12 Object API State Of Health Packet (OBJ_API_SOH)

Object Application Programmers Interface State of Health Telemetry

Name: *OBJ_API_SOH*
Application ID: *213*
Virtual Channel: *9*
Boot: *True*

Operational: *True*
Timeout (seconds): *2*
Packet Length: *5*

Interface Definition 3-158 OBJ_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	213	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	8	None	OAS_NUM_BAD	UInt8	None	Number of bad objects detected during scrubbing.
11	0	4	None	OAS_NUM_SELECTED_BAD	4BitUInt8	None	Number of selected/bad objects detected during scrubbing.
11	4	4	None	OAS_SPARE	4BitUInt8	None	Reserved.

3.3.2.1.2.3.13 RIU Housekeeping Raw Data (RIU_HOUSEKEEPING_DATA)

The RIU Housekeeping Raw Data Packet contains RUI housekeeping sample list data.

Name: *RIU_HOUSEKEEPING_DATA*
Application ID: *299*
Virtual Channel: *9*
Boot: *False*
Operational: *True*
Timeout (seconds): *30*
Packet Length: *33*

Interface Definition 3-159 RIU_HOUSEKEEPING_DATA

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	299	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	33	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	(15)	RIU_DATA_WORDS	UInt16	None	RIU Data.

3.3.2.1.2.3.14 Return Link Table API State Of Health Packet (RLT_API_SOH)

Return Link Table Application Programmers Interface State of Health Telemetry

Name: *RLT_API_SOH*
Application ID: *227*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *5*

Interface Definition 3-160 RLT_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	227	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	RAS_ERRORS	UInt16	None	Total RLT errors since boot. Incremented if: 1) There is no data for a requested SAM 2) Invalid state for SAM during a put or get 3) Unknown SAM requested 4) Null pointer passed to RLT_Soh() API or RLT_Diag() API

3.3.2.1.2.3.15 Return Link State of Health Packet (RL_SOH)

The Return Link State of Health Packet is TBS

Name: *RL_SOH*
Application ID: *296*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *5*

Interface Definition 3-161 RL_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	296	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	8	None	RS_PKTS_SENT	UInt8	None	TBS
11	0	8	None	RS_OBJ_ID	UInt8	None	TBS

3.3.2.1.2.3.16 Raw Status Summary Bits Packet (STATUS_SUMMARY)

The Raw Status Summary Bits Packet provides the latest status summary for the FSC

Name: *STATUS_SUMMARY*
Application ID: *144*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *15*

Interface Definition 3-162 STATUS_SUMMARY

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	144	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	15	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	(4)	STATUS_SUMMARY_BITS	UInt16	Index 0, represents status summary bits 48 - 63 Index 1, represents	Status summary bits (64 bits).

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						status summary bits 32 - 47 Index 2, represents status summary bits 16 - 31 Index 3, represents status summary bits 0 - 15 Refer to Appendix G for additional information	
18	0	16	None	EVENT_COUNT	UInt16	None	Event count. Will wrap around from 65535 to zero.
20	0	16	None	LOST_EVENT_COUNT	UInt16	None	Lost Event count. Will wrap around from 65535 to zero.

3.3.2.1.2.3.17 Task Manager State Of Health Packet (TASK_MGR_SOH)

The Task Manager State Of Health Packet

Name: *TASK_MGR_SOH*
Application ID: *260*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *5*

Interface Definition 3-163 TASK_MGR_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	260	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	8	None	TMS_TASK_COUNT	UInt8	None	Number of tasks.
11	0	8	None	TMS_SUSPENDED_COUNT	UInt8	None	Number of suspended tasks

3.3.2.1.2.3.18 Timer API State of Health Packet (TIMER_API_SOH)

Timer Application Programmers Interface State of Health Telemetry

Name: *TIMER_API_SOH*
Application ID: *265*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *5*

Interface Definition 3-164 TIMER_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	265	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	16	None	TAS_COUNT	UInt16	None	Number of timers configured.

3.3.2.1.2.3.19 Telemetry Processing Task State Of Health Packet (TLM_PROC_TASK_SOH)

The Telemetry Processing Task State Of Health Packet

Name: *TLM_PROC_TASK_SOH*
Application ID: *267*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *1.5*
Packet Length: *15*

Interface Definition 3-165 TLM_PROC_TASK_SOH

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	267	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	15	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	TPTS_TOTAL_SAMS_PROCESSED	UInt16	None	Total Number of SAMs successfully decomed. This includes SAMs from normal telemetry and SCEs. This number is cumulative. After 65535 is reached, the number rolls-over to zero.
12	0	16	None	TPTS_TOTAL_ERRS	UInt16	None	Total number of errors. This includes all types of errors (decom errors, frames being dropped, etc.). Also this number is cumulative. After 65535 is reached, the number rolls-over to zero.
14	0	16	None	TPTS_RTCOS_GEN	UInt16	None	Total number of RTCOs produced by telemetry processing. This number includes RTCOs from normal telemetry and SCEs. This number is cumulative. After 65535 is reached, the number rolls-over to zero.
16	0	16	None	TPTS_SAMS_PEND	UInt16	None	Number of SAMs pending at input queues at beginning of telemetry processing pass. This number includes both the queue for normal telemetry input and SCE input. This number is reset after each telemetry processing pass. It is not a cumulative number.
18	0	16	None	TPTS_RTCOS_DROP	UInt16	None	Total number RTCOs dropped due to queue over-flow. This number includes both the normal telemetry RTCO queue and the SCE RTCO queue. This number is cumulative. After 65535 is reached, the number rolls-over to zero.
20	0	2	None	TPTS_STATE	2BitUInt16	0 - DOWN 1 - RUNNING 2 - IDLE 3 - INVALID	Current state of telemetry processing. 0) Down 1) Running 2) Idle 3) Invalid
20	2	14	None	TPTS_SPARE	14BitUInt16	None	Reserved.

3.3.2.1.2.3.20 Uplink Status Packet (UPLINK_STATUS)

The Uplink Status Packet

Name: *UPLINK_STATUS*
Application ID: *164*
Virtual Channel: *9*
Boot: *True*

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Operational: **True**
Timeout (seconds): **1.5**
Packet Length: **23**

Interface Definition 3-166 UPLINK_STATUS

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	164	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	23	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	32	None	FWL_STATUS	UInt32	None	Status code from the FWL device driver.
14	0	32	None	FWL_PARITY_STATUS	UInt32	None	Status of the parity check for the last command from the FWL device driver.
18	0	16	None	FWL_BYTES_COPIED	UInt16	None	Number of bytes copied by the FWL device driver.
20	0	16	None	FWL_BYTES_DROPPED	UInt16	None	Number of bytes dropped by the FWL device driver.
22	0	16	None	GROUND_AUTHENTICATE_COUNT	UInt16	None	Ground authenticate count. This is the 14 bit authentication count maintained by the Flight Software. This value matches the Authentication count telemetry seen in the Forward Link Protocol
24	0	16	None	GROUND_BLK_SEQ_CNT	UInt16	None	Block load sequence count. This value will indicate the last accepted block load packet from the ground. The count is reset to 0 when an MEM_BLE or OBJ_BLE command is received.
26	0	1	None	GROUND_UPLINK_STATE	1BitUInt16	0 - NORMAL 1 - BLOCK_LOAD	Ground uplink state. 0) 0 - Normal 1) 1 - Block Load
26	1	3	None	FWL_CMD_STATUS	3BitUInt16	0 - OK 1 - UNDERFLOW 2 - PARITY_ERROR	Status value of the last command from the FWL device driver. 0) OK 1) Underflow 2) Parity Error
26	4	4	None	GROUND_UPLINK_STATUS	4BitUInt16	0 - SUCCESS 1 - FAILED 2 - BAD_STATE 3 - BAD_PARAM 4 - UNEXPECT_MSG 5 - BLKLOAD_ERR 6 - AUTHEN_FAIL 7 - TIMEOUT 8 - BAD_FORMAT 9 - BAD_SAMCH	Ground uplink status. This 16 bit value contains uplink status information such as status codes, uplink modes, etc.. This value matches the Authentication Bypass telemetry seen in the Forward Link Protocol 0) Successful command 1) Command failed 2) Task is in an invalid state for the command 3) Invalid parameter 4) Unexpected message received 5) Block load failure

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Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
						10 - INTERNAL_ERR 15 - UPLINK_BUSY	6) Authentication failure 7) No disposition received 8) Command has incorrect format 9) Incorrect SAM characteristic detected 10) Internal uplink error 15) Processing command
27	0	8	None	GROUND_CMD_ID	8BitUInt16	None	Ground command id.
28	0	8	None	GROUND_ACCEPT_COUNT	UInt8	None	Ground accept count. This value states how many FSC Commands have been Accepted. This value matches the Accept count telemetry seen in the Forward Link Protocol
29	0	8	None	GROUND_REJECT_COUNT	UInt8	None	Ground reject count. This value states how many FSC Commands have been rejected. This value matches the Reject count for the telemetry seen in the Forward Link Protocol.

3.3.2.1.2.3.21 Version State of Health Packet (VERSION_SOH)

The Version State of Health Packet

Name: *VERSION_SOH*
Application ID: *270*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *5*

Interface Definition 3-167 VERSION_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	270	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	5	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved.
10	0	4	None	VS_VERSION	4BitUInt8	1 - 2	Version Specfier

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
10	4	4	None	VS_BUILD	4BitUInt8	1 - 5	Build Specfier
11	0	8	None	VS_RELEASE	UInt8	1 - 255	Release Specfier

3.3.2.1.2.3.22 Watchdog API State of Health Packet (WDOG_API_SOH)

The Watchdog State of Health Packet

Name: *WDOG_API_SOH*
Application ID: *272*
Virtual Channel: *9*
Boot: *True*
Operational: *True*
Timeout (seconds): *2*
Packet Length: *9*

Interface Definition 3-168 WDOG_API_SOH

Byte Offset	Bit Offset	# of Bits	Dimension	Field Name	Data Type	Constraints	Description
0	5	11	None	APID	UInt16	272	Application Identifier for telemetry packet.
4	7	9	None	PACKET_LENGTH	UInt16	9	Telemetry packet length.
8	0	8	None	AP_SUBID	UInt8	0 - SUB_RES	Application packet sub-identifier. 0) Reserved
10	0	16	None	WAS_REG_MASK	UInt16	0 - NOT_REGISTERED 1 - REGISTERED	Is Task registered with watchdog? 0) Not Registered 1) Registered
12	0	16	None	WAS_ENA_MASK	UInt16	0 - NOT_ENABLED 1 - ENABLED	Is Task watchdog enabled? 0) Not Enabled 1) Enabled
14	0	1	None	WAS_OK	1BitUInt16	0 - NOT_OK 1 - OK	Did all monitored tasks report within the required interval? 0) Not Ok 1) Ok
14	1	15	None	WAS_SPARE	15BitUInt16	None	Reserved.

3.3.2.2 Instrument Virtual Channel Data Unit (VCDU)

The Instrument Virtual Channel Data Unit (VCDU) is further subdivided into the Instrument Science Data VCDU and the Instrument Diagnostic Data VCDU. The Instrument Science Data VCDU is used to downlink the instrument's science observation data and is defined in the FAME Instrument to Bus Interface Control Document (ICD). The Instrument Diagnostic Data VCDU is used to downlink diagnostic telemetry for the instrument via the DDRM and is identical to the format of the Housekeeping VCDU. Refer to the FAME Instrument to Bus Interface Control Document (ICD) for the detailed specification of the CCSDS packets contained in Instrument Diagnostic Data VCDUs.

3.4 RF Interface

Table 3-9. FAME RF Summary

Downlink	
Data Rate	Low rate (min)=1k (2.29ksps); High rate (max)=500kbps (1.1435Msps)
Coding	Reed-Solomon & convolutional
Modulation	Low rate=NRZ-M, BPSK-modulated onto 1.7 MHz subcarrier, which is PM onto carrier (mod index=1.6 rad); High rate=NRZ-M, BPSK-modulated onto carrier
Required Eb/No	3.0dB
Margin (min)	3.0dB
Frequency	2.200-2.290GHz [2273.9MHz]
End-to-End Delay	See "SOC-MOC Interfaces" chart
Uplink	
Data Rate	2 kbps
Modulation	NRZ-M data BPSK-modulated synchronously onto 16 KHz sinewave subcarrier; Mod index = 1 rad
Coding	None
Margin (min)	7.0dB
Frequency	2.025-2.110GHz; $[f_{d/I} * (221/240) = 2093.8892 \text{ MHz}]$
Ranging*	
Ranging	Derived from uplink; PRN directly PM onto downlink carrier at 0.5 rad; Noise<3m, Bias<15m
Range-rate	Noise<3mm/sec

* Simultaneous Telemetry & Ranging at Low Rate

3.4.1 Spacecraft Transponder Description

The FAME spacecraft transponder performs the following functions:

3.4.1.1 Coherent Operation

The transponder provides Coherent Operation in which the downlink carrier signal is 240/221 times the uplink frequency and phase locked to the uplink carrier.

3.4.1.2 Non-Coherent Operation

In the absence of an S-Band uplink signal or upon receipt of the AUX OSC=ON command, the S-Band downlink carrier frequency is derived from an internal auxiliary oscillator (AUX OSC). The internally generated downlink signal is 240/221 times the assigned uplink frequency.

3.4.1.3 Ranging

The spacecraft transponder demodulates the ranging signal from the uplink carrier and re-modulates the signal on the downlink carrier upon receipt of a suitable command from the user. Ranging channel performance is in accordance with the requirements of The NASA DSN Tracking and Ranging System as described in the NASA 810-5 DSN Users Guide.

3.4.1.4 Receiver Functions

The spacecraft transponder acquires the uplink carrier at the designated S-Band frequency and demodulates the 16 kHz command subcarrier from the S-Band uplink signal. The transponder detects and demodulates the 2 kbps NRZ-M command data from the subcarrier and converts it from NRZ-M to NRZ-L. The spacecraft receiver receives and demodulates uplink ranging modulation from 1 kHz to 500 kHz, either separately or in addition to the uplink command data, and provides the demodulated ranging

output to the transmitter. The spacecraft receiver also provides a coherent frequency reference to the on-board transmitter.

3.4.1.5 Auxiliary Input

The receiver section of the transponder provides an auxiliary input for 2 kbps data synchronously BPSK modulated on a 16 kHz sinewave. The auxiliary command input is used during integration and testing as a hardwired command link that bypasses the RF uplink.

3.4.1.6 Transmitter Functions

The spacecraft transmitter operates at a raw data rate between 1 kbps and 16 kbps designated as “Low Rate” or at any rate between 100 kbps and 1 Mbps designated as “High Rate”. Low and High rate modes are selectable via commands to the transponder, however the actual data rate shall be determined by the spacecraft input clock rate. When operating in Low Rate Mode, the data is BPSK modulated on a 1.7 MHz subcarrier that is phase modulated onto the carrier. When operating in High Rate Mode, the data is BPSK modulated directly onto the carrier. The transponder provides NASA standard convolutional encoding, and NRZ-L to NRZ-M conversion.

Table 3-10. Transponder Modes

State	Controlled By	Remarks
Automatic VCO/AUX Oscillator Switching (i.e., automatic coherent to non-coherent switching)	Receiver Lock Voltage and AUX OSC – ON/OFF Command	Transmitter frequency source is the coherent receiver VCO when the receiver is locked, and is a non-coherent AUX OSC when the receiver is out-of-lock. Automatic oscillator switching is when the AUX OSC – OFF command is received.
AUX OSC Only (i.e., non-coherent mode only)	AUX OSC – ON Command	AUX OSC – ON command overrides the receiver lock signal control and forces the transmitter source to be a non-coherent oscillator (The auxiliary oscillator) whether the receiver is locked or not.
Subcarrier ON/OFF	a. Subcarrier – ON b. Subcarrier – OFF Telemetry Data Rate Is 1 kbps to 16 kbps for Subcarrier Mode	Enables or Disables 1.7 MHz telemetry subcarrier from transmitter modulator. Ranging channel shall still operate if Ranging CMD = ON
Turnaround Ranging Channel ON/OFF	a. Ranging – ON Command b. Ranging – OFF Command	Closes and opens the ranging input signal path to the transmitter phase modulator input.
Direct BPSK Downlink	Ranging = OFF AND Subcarrier = OFF Data Rate Determined By PCM Data Input Clock Signal Rate. From 100 kbps to 1 Mbps	When both Ranging and Subcarrier = OFF, the transmitter shall be in Direct BPSK mode.
Command Data Bit Rate	Fixed at 2 kbps	NRZ-M format modulated on subcarrier, converted to NRZ-L after detection.
Transmitter ON/OFF	Transmitter ON Command Transmitter OFF Command	Transmitter is turned ON or OFF upon receipt of command.
Receiver ON/OFF	Prime Power from User’s Power System	Prime power is turned ON or OFF to the receiver external to the transponder.
Auxiliary Command ON/OFF	AUX CMD Switch Closures by externally shorting AUX CMD pins to AUX CMD RETURNS	Selects the AUX CMD interface for processing command data regardless of whether the receiver is phase locked. Used for testing with RF uplink bypassed.
PCM Telemetry Data Convolutionally Encoded	Convolutional Encoder – ON Convolutional Encoder – OFF	Convolutional Encoder – ON Command enables the convolutional encoding of PCM data; Convolutional Encoder – OFF Command bypasses the encoder.
AGC Enable/Disable	AGC Enable Command AGC Disable Command	Receiver gain control is enabled (linear operation) or disabled (max gain) upon receipt of commands.

3.4.2 RF Uplink

The spacecraft receiver operates at a single S-Band uplink frequency between 2025 MHz and 2120 MHz. The tentative frequency uplink assignment is 2093.8892 MHz. The spacecraft receiver receives commands and/or ranging signals that have been modulated onto the uplink carrier. The FAME uplink is unencrypted.

3.4.2.1 Uplink Tracking

3.4.2.2 Uplink Carrier Tracking Threshold

The worst case tracking threshold at the spacecraft receiver worst-lock frequency shall be at an uplink signal level no greater than -125 dBm sweeping at up to 32 kHz/sec.

3.4.2.3 Tracking Range

The tracking range at strong uplink signal (-90 dBm) shall be ± 150 kHz minimum. (-20°C to 60°C.)

3.4.2.4 Phase Lock Loop Bandwidth

The noise bandwidth (2BLo) of the loop filter at tracking threshold will be 800 Hz $\pm 10\%$, non-expanding over the input dynamic range.

3.4.2.5 Automatic Gain Control (AGC)

The spacecraft receiver uses a coherent carrier AGC loop, which is commandable OFF to accommodate high input dynamic conditions.

3.4.2.5.1 AGC Loop Bandwidth

The spacecraft receiver AGC is commandable to both enable and disable modes. In the AGC enable mode the AGC loop bandwidth is nominally 150 Hz enabling the tracking out of 15 dB of AM at 20 Hz per STD-336-M02-NE. In the AGC disable mode the receiver amplifier stage gains are clamped at their maximum levels regardless of the RF input signal level and enable the receiver to remain locked to the uplink signal with 25 dB of AM at 100 Hz as long as the input signal exceeds the tracking threshold.

3.4.2.5.2 AGC Linearity

In the AGC-enable mode, the variation in AGC voltage versus uplink carrier power level shall be within 20% of a best straight line from threshold (-125 dBm) to -50 dBm.

3.4.3 Command Channel

Uplink commands will be transmitted as phase modulation on the uplink carrier as PCM NRZ-M data BPSK modulated synchronously on a 16 kHz sinewave subcarrier. The spacecraft receiver demodulates the uplink carrier, detects the command data, and provides the data output as RS422 compatible NRZ-L data and associated bit timing clock to the spacecraft controller. The transponder has a Command Detect Unit (CDU) Lock indicator which indicates when command data is present and the command detect circuit is locked. The transponder also provides a Receiver In-Lock Indicator to the spacecraft command system that indicates when the Receiver is locked to the RF uplink carrier.

3.4.3.1 Command Data Bit Rate

The command data bit rate is 2000 bits per second (fixed).

3.4.3.2 Command Modulation Index

The uplink command modulation index is 1 radian peak $\pm 10\%$.

3.4.3.3 Command Threshold

The total receiver input power (P_T), with a modulation index of 1 radian at 1 kbps data rate, that is required to produce a bit error rate at the output of the receiver equal to 1×10^{-5} is -120 dBm or less.

3.4.3.4 Command Acquisition and Tracking Range

The command detector within the spacecraft receiver acquires and tracks the subcarrier and data transitions within the command signal when the frequency is 16 kHz \pm 1.6 Hz with a maximum rate of change of \pm 0.05 Hz/sec.

3.4.3.5 Command Acquisition Sequence

The command acquisition sequence is defined as a sequence of transitions at the command data bit rate, synchronously BPSK modulated onto a sinewave subcarrier of 16 kHz. The length of the command acquisition sequence is 96 bits for a probability of acquisition of 0.9999 at command a data rate of 2 kbps.

3.4.3.6 Command Data

The command data output from the spacecraft receiver corresponds to the data transmitted from the ground. No inversion ambiguity should exist since NRZ-M data is being used on the uplink signal.

3.4.3.7 Command Lock Indicator

The CDU lock indicator is a discrete, bi-level signal that indicates when the CDU is locked to the incoming command signal subcarrier.

3.4.4 RF Downlink

The spacecraft transmitter operates at a single downlink frequency between 2200 MHz and 2300 MHz. The tentative downlink frequency assignment is 2273.9 MHz. The FAME downlink is unencrypted.

The spacecraft transmitter transmit the following signals:

- High Rate Data Directly BPSK Modulated On Carrier
- Low Rate Data BPSK Modulated On PM Subcarrier
- Ranging Modulation Only
- Ranging Modulation And Low Rate Data On Subcarrier

3.4.4.1 Transmitter Characteristics

3.4.4.1.1 Transmitter Modes of Operation

The spacecraft transmitter is capable of operating in either the coherent or non-coherent modes as defined below and accommodates the following downlink signals

High Rate Data Bi-Phase-Shift-Key (BPSK) modulated onto the carrier

Low Rate Data BPSK modulated onto a 1.7 MHz subcarrier that is phase modulated (PM) onto the carrier

Pseudo-random Ranging Signal derived from the uplink and directly phase modulated (PM) onto the downlink carrier

A linear combination of the Ranging and Low Rate Data modulated subcarrier signal described above

Carrier Only (No Modulation)

3.4.4.1.2 Coherent Mode

When operating in the coherent mode, the spacecraft transmitter uses a coherent reference signal derived from the received uplink RF carrier to generate the downlink RF carrier frequency. The ratio of the derived downlink RF carrier frequency to received uplink frequency shall be 240/221.

3.4.4.1.3 Non-Coherent Mode

When operating in non-coherent mode, the RF carrier downlink frequency is derived from a fixed frequency, internal auxiliary reference oscillator.

3.4.5 Downlink Output Characteristics

3.4.5.1 RF Output Frequency

The planned RF downlink frequency assignment is 2273.9 MHz.

3.4.5.2 Downlink Phase Noise

The spacecraft transmitter residual phase noise modulation and dynamic phase error will not exceed 4 degrees rms or 9 degrees peak at the S-Band output when measured in a double-sided noise bandwidth of 300 Hz and when operating in the coherent or non-coherent modes.

3.4.5.3 Transmitter RF Power Output

The transmitter RF power output shall be 4-Watts minimum over all temperatures from -20°C to +60°C.

3.4.5.4 Convolutional Encoder

The spacecraft convolutional encoder implements the GSFC NASA Standard convolutional encoding with a constraint length $K=7$ and code rate $r = 1/2$. The convolutional encoder is commandable to be either enabled or bypassed.

3.4.5.5 Turnaround Frequency Ratio

The spacecraft transponder is designed with a fixed uplink to downlink frequency ratio at 221/240. The transponder derives a downlink carrier frequency reference from the uplink carrier (Coherent Mode) or generates the downlink carrier from an internal reference oscillator (Non-Coherent Mode).

Table 3-11. Spacecraft Transponder Control Commands

Mnemonic	Command
TBD	Transmitter – ON
TBD	Transmitter - OFF
TBD	AUX CMD – ON/OFF (Primary)
TBD	AUX CMD ON/OFF (Redundant)
TBD	Ranging – ON
TBD	Ranging - OFF
TBD	AUX OSC – ON (Non-coherent)
TBD	AUX OSC – OFF (Coherent)
TBD	Subcarrier – ON
TBD	Subcarrier - OFF
TBD	Convolutional Encoder – ON
TBD	Convolutional Encoder - OFF
TBD	AGC Enable
TBD	AGC Disable

Table 3-12. Transponder Status & Health Telemetry Indicators

Mnemonic	Telemetry Item
TBD	Transmitter ON/OFF
TBD	AUX CMD ON/OFF
TBD	Ranging ON/OFF
TBD	AUX OSC ON/OFF (Non-coherent/ Coherent)
TBD	Subcarrier ON/OFF
TBD	Convolutional Encoder ON/OFF

Mnemonic	Telemetry Item
TBD	AGC Enable/Disable
TBD	Loop Stress
TBD	Signal Strength (AGC)
TBD	Command Detector Unit Locked/Unlocked
TBD	Receiver Temperature
TBD	Transmitter Temperature
TBD	Transmitter RF Power
TBD	Transmitter DC Converter ON/OFF
TBD	Receiver Locked/Unlocked
TBD	Decryptor Locked/Unlocked
TBD	Transfer Switch – Norm/Cross
TBD	Internal DC Voltage Monitors
TBD	Internal DC Voltage Monitors

3.4.6 Ranging

3.4.6.1 Uplink Ranging Signal

The uplink (received) ranging signal will be remodulated on the downlink carrier at a level between 0.35 and 0.7 radians (nominal is 0.5) peak. The DSN sequential ranging (binary) signal will be used. The maximum binary rate will be the approximately 512 kHz clock (see 810-5 DSN Manual). All codes from 1 kHz to 512 kHz clock must be accommodated.

3.4.6.2 Ranging Channel Input / Output Polarity

The transponder does not invert the ranging channel. A positive ranging modulation phase deviation on the uplink carrier shall cause a positive phase deviation on the downlink carrier.

3.4.6.3 Downlink Modulation Index

The spacecraft transponder demodulates the ranging tones or codes from the uplink carrier and remodulates them on the downlink carrier. The downlink ranging modulation index is set with a channel SNR of 20 dB or greater in the post detection bandwidth. The modulation index for ranging-only will be 0.5 radians peak (sinewave). The downlink ranging modulation index shall not vary as a result of changes in the uplink ranging modulation index. A modulation index is set to within $\pm 5\%$ of the specified value.

3.4.6.4 Ranging Channel Bandwidth

The turnaround ranging post-detection bandwidth will be selected at time of transponder design.

Table 3-13. Ranging Channel Performance

Uplink Frequency Offset	± 140 kHz
Uplink Total Signal Power Level	-122 dBm to -50 dBm
Uplink Ranging Signal Carrier Suppression	3 to 9 dB (squarewave)
Uplink Ranging Signal Modulation Index: Single Tone	0.5 radians
Integration Time	60 seconds
Downlink Telemetry Carrier Suppression	7 dB nominal (unmodulated 1.7 MHz subcarrier)
Downlink Ranging Modulation Index	0.5 radians peak per 3.11.3
Uplink Ranging Signal	DSN Sequential Ranging and Tone Ranging Systems (810-5 DSN Manual, TRK sections)
Downlink Ranging Signal	DSN Sequential Ranging and Tone Ranging Systems (810-5 DSN Manual, TRK sections)

NOTE: The sum of the ranging and telemetry modulation indices shall not exceed 2.4 radians peak.